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REPORT

OF THE

SURGEON-GENERAL OF THE ARMY

TO THE

SECRETARY OF WAR

FOR THE

FISCAL YEAR ENDED JUNE 30, 1900.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1900.

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REPORT

OF

THE SURGEON-GENERAL.

WAR DEPARTMENT,
SURGEON-GENERAL'S OFFICE,
Washington, D. C., October 17, 1900.

SIR: In submitting a report of my administration of the duties of this office during the past year, I have the honor, first, to invite attention to a statement of the financial transactions for the year ended June 30, 1900.

FINANCIAL STATEMENT, 1900.[1]

Medical and hospital department, 1900.

Appropriated by act approved March 3, 1899	$1,500,000.00	
Transferred from appropriation "Medical and hospital department, 1899," by act approved February 9, 1900	500,000.00	
		$2,000,000.00
Gain on exchange of funds to insular possessions	12.50	
Refunded during the year (including transfer settlements by Treasury Department to adjust appropriations, $12)	424.54	
		437.04
Total to be accounted for		2,000,437.04
Disbursed during the year:[2]		
Expenses of medical supply depots	547.03	
Medical supplies	1,164,419.72	
Medical attendance and medicines	13,680.92	
Medical expenses of recruiting	49,751.04	
Pay of nurses	124,146.24	
Pay of other employees	137,286.72	
Washing of hospital linen	58,005.54	
Expressage on medical property	948.18	
Exchange on funds to insular possessions	437.50	
Notarial fees	30.75	
		1,549,253.64

[1] The disbursements in this statement include settlements with public creditors made by the accounting officers of the Treasury and charged by them to these appropriations.

[2] Disbursements during June and balance June 30, 1900, at Cebu, P. I., have not at this date (October 10, 1900) been accounted for to this office, doubtless because of irregularity of mail communication.

Transferred by Treasury settlements to adjust appropriations		$5,719.51
Balances on hand June 30, 1900:		
In United States Treasury	$337,239.56	
In hands of disbursing officers—		
New York	34,922.17	
Washington	15,083.34	
St. Louis	14,427.01	
San Francisco	11,824.37	
St. Michael, Alaska	4,790.05	
Honolulu, H. I	1,528.18	
Manila, P. I	17,491.47	
Iloilo, P. I	603.93	
Cebu, P. I. (May 31, 1900)[1]	93.67	
Aparri, P. I	31.54	
Havana, Cuba	1,696.83	
Santiago, Cuba	406.41	
San Juan, P. R	2,668.08	
Ponce, P. R	2,655.95	
Hospital ship *Relief*	1.33	
		445,463.89
Total accounted for		2,000,437.04

Medical and hospital department, 1899.

Balances on hand July 1, 1899, acts of March 15, 1898, January 5, 1899, and March 3, 1899		[2]$1,454,151.99
Gain on exchange of funds to insular possessions	$19.36	
Refunded during the year (including transfer settlements by Treasury Department to adjust appropriations, $6,323.99)	7,071.44	
		7,090.80
Total to be accounted for		1,461,242.79
Disbursed during the year:		
Expenses of medical supply depots	69.18	
Medical supplies	478,817.75	
Medical attendance and medicines	41,640.94	
Medical expenses of recruiting	7,125.98	
Medical expenses of muster out	99.60	
Pay of nurses	14,150.24	
Pay of other employees	3,118.33	
Washing of hospital linen	4,527.94	
Expressage on medical property	1,661.28	
Exchange on funds to insular possessions	114.57	
		551,325.81
Transferred by Treasury settlements to adjust appropriations		24,835.28
Transferred to appropriation "Medical and hospital department, 1900," by act approved February 9, 1900		500,000.00
Balances on hand June 30, 1900:		
In United States Treasury	$349,837.31	
In hands of disbursing officers:		
Washington, D. C	27,946.97	
Manila, P. I	7,297.42	
		385,081.70
Total accounted for		1,461,242.79

[1] See note 2 on page 7.

[2] The balance June 30, 1899, as given in my last annual report ($1,448,387.37), was based in part upon information by cable from Manila, which was subsequently, upon the receipt of itemized accounts by mail, found to be erroneous.

Medical and hospital department, 1898.

Balances on hand July 1, 1899, act of March 2, 1897		$366.18
Refunded during the year		14.37
Total to be accounted for		380.55
Disbursed during the year:		
Medical supplies	$26.72	
Medical attendance and medicines	339.05	
		365.77
Transferred to surplus fund		14.78
Total accounted for		380.55

Medical and hospital department, January 1, 1899.

Balances on hand July 1, 1899, acts of May 4, June 8, and July 7, 1898 (net)		[1]84,918.66
Refunded during the year (including transfer settlements by Treasury Department to adjust appropriations, $24,834)		24,895.63
Total to be accounted for		29,814.29
Disbursed during the year:		
Medical supplies	$654.02	
Medical attendance and medicines	48.00	
Medical expenses of recruiting	90.00	
Pay of nurses	1,604.87	
Pay of other employees	321.68	
Washing of hospital linen	564.17	
Miscellaneous	10.31	
		3,293.05
Balances on hand June 30, 1900:		
In United States Treasury	25,991.71	
In hands of disbursing officer at Manila, P. I.	529.53	
		26,521.24
Total accounted for		29,814.29

Medical and hospital department, certified claims.

Appropriated by act approved June 6, 1900	$318.93
Disbursed during the year	318.93

Appropriation for national defense, act of March 9, 1898.

Allotment by the President April 16, 1898:	
Balance on hand July 1, 1899	$5.51
Balance in United States Treasury June 30, 1900	5.51
Reallotment by the President September 8, 1898:	
Balance on hand July 1, 1899	1,679.78
Refunded during the year (including transfer settlements by Treasury Department to adjust appropriations, $34)	51.00
Total to be accounted for	1,730.78

[1] Actual balances, as shown by the books of this office, $12,715.27, of which $7,796.61 was pledged to honor drafts made by the medical disbursing officer in the Philippine Islands on the Hongkong and Shanghai Banking Corporation under a letter of credit issued in his favor. These drafts were paid by the bank and the proceeds thereof were accounted for during the year ended June 30, 1899. The bank was reimbursed by the Treasury Department in August, 1899.

Reallotment by the President September 8, 1898—Continued.		
Disbursed during the year: Medical attendance and medicines		$138.19
Balance in United States Treasury June 30, 1900		1,592.59
Total accounted for		1,730.78
Allotment by the President October 6, 1898:		
Balance on hand July 1, 1899		44,521.89
Refunded during the year		194.58
Total to be accounted for		44,716.47
Disbursed during the year:		
Expenses of medical supply depots	$1.50	
Medical supplies	834.82	
Medical attendance and medicines	17,938.99	
Medical expenses of recruiting	438.70	
Pay of nurses	333.75	
Washing of hospital linen	302.07	
		19,849.83
Transferred by Treasury settlement to adjust appropriation		742.01
Balance in United States Treasury June 30, 1900		24,124.63
Total accounted for		44,716.47
Allotment by the President November 22, 1898:		
Balance on hand July 1, 1899		26,236.30
Refunded during the year		12.00
Total to be accounted for		26,248.30
Disbursed during the year:		
Medical supplies	1,100.95	
Medical attendance and medicines	53.66	
Medical expenses of recruiting	3,300.31	
Pay of nurses	54.00	
Washing of hospital linen	257.70	
		4,766.62
Balance on hand June 30, 1900:		
In United States Treasury	13,153.26	
In hands disbursing officer, Washington, D. C.	8,328.42	
		21,481.68
Total accounted for		26,248.30

Artificial limbs, 1900.

Appropriated by act approved March 3, 1899	$547,275.00
Disbursed during the year	503,972.95
Balance on hand June 30, 1900	43,302.05

Artificial limbs, 1899 (act approved July 1, 1898).

Balance July 1, 1899		$2,621.09
Disbursed during the year	$2,396.09	
Transferred by Treasury settlements to adjust appropriations	225.00	
		2,621.09

Artificial limbs, 1898 (act approved June 4, 1897).

Balance July 1, 1899	$16,516.21
Refunded during the year (being the amount transferred by Treasury Department to adjust appropriations)	150.00
Total to be accounted for	16,666.21
Disbursed during the year	1.20
Transferred to surplus fund	16,665.01
Total accounted for	16,666.21

Artificial limbs, 1897 (act approved June 11, 1896).

Balance July 1, 1899	$540.16
Refunded during the year (being the amount transferred by the Treasury Department to adjust appropriations)	75.00
Total to be accounted for	615.16
Transferred to surplus fund	615.16

Appliances for disabled soldiers, 1900.

Appropriated by act approved March 3, 1899	$2,000.00
Disbursed during the year	1,020.50
Balance on hand June 30, 1900	979.50

Appliances for disabled soldiers, 1899 (act approved July 1, 1898).

Balance July 1, 1899	$722.11
Disbursed during the year	32.00
Balance on hand June 30, 1900	690.11

Appliances for disabled soldiers, 1898 (act approved June 4, 1897).

Balance July 1, 1899	$590.54
Transferred to surplus fund	590.54

Appliances for disabled soldiers, 1897 (act approved June 11, 1896).

Balance July 1, 1899	$285.02
Transferred to surplus fund	285.02

Army Medical Museum, 1900.

Appropriated by act approved March 3, 1899	$5,000.00
Disbursed during the year	2,886.57
Balance on hand June 30, 1900	2,113.43

Army Medical Museum, 1899 (act approved March 15, 1898).

Balance July 1, 1899	$1,636.31
Disbursed during the year	1,621.51
Balance on hand June 30, 1900	14.80

Army Medical Museum, certified claims.

Appropriated by act approved June 6, 1900	$0.75
Disbursed during the year	.75

Library, Surgeon-General's Office, 1900.

Appropriated by act approved March 3, 1899	$10,000.00
Disbursed during the year	8,775.37
Balance on hand June 30, 1900	1,224.63

Library, Surgeon-General's Office, 1899 (act approved March 15, 1898).

Balance July 1, 1899	$273.36
Disbursed during the year	273.36

Furnishing trusses to disabled soldiers (sections 1176, 1177, 1178, Revised Statutes, and act of March 3, 1879).

Expended during the year	$7,798.47

ARTIFICIAL LIMBS AND THEIR COMMUTATION.

Under the laws relating to artificial limbs there were furnished in kind during the year ended June 30, 1900, 292 artificial legs, 9 artificial arms, 2 artificial feet, and 1 apparatus for exsection. Commutation certificates were issued for 2,570 cases of amputated leg, 2,759 of amputated arm, 66 of amputated foot, and for 2,881 cases of the loss of the use of a limb. The sum of $506,595.24 was expended during the year in settling these claims.

The benefits under these laws recur every three years. The claimants who are being paid during the current year ending June 30, 1901, are the survivors of the beneficiaries of the year ended June 30, 1898. The sum of $173,000 was estimated for and appropriated for their benefit. The claims which will be presented for settlement during the year ending June 30, 1902, will be made by the survivors of those who were last paid during the year ended June 30, 1899, when $125,038.91 was disbursed in settlement. Estimates for $125,000 have been submitted for 1902. It was considered injudicious to reduce the estimates below the sum required three years ago, as deaths among disabled veterans of the civil war may to a considerable extent be offset by cases arising as a result of disabilities incurred during the past two years in Cuba, Porto Rico, and the Philippines.

APPLIANCES FOR DISABLED SOLDIERS.

During the past year the sum of $1,052.50 was expended for 140 appliances issued to disabled soldiers.

TRUSSES.

The number of trusses issued and fitted during the year was 1,054.

PROVIDENCE HOSPITAL.

The act of Congress approved June 6, 1900, appropriated $19,000 for the support and medical treatment of destitute patients in the city of Washington, D. C., under a contract to be made with the Providence Hospital by the Surgeon-General of the Army. The amount of relief afforded under this appropriation was as follows:

Patients in hospital July 1, 1899	143
Admitted during the year	1,349
Total number treated	1,492
Average number admitted per month	124
Number remaining in hospital June 30, 1900	135
Total number of days' treatment afforded	43,560
Average number of days' treatment per patient	40
Average number of patients treated per day	111
Longest term of treatment (days)	365
Shortest term of treatment (day)	1
Number of patients in hospital during the whole year	24

ARMY AND NAVY GENERAL HOSPITAL, HOT SPRINGS, ARK.

Officers' division.—Twenty-seven officers were under treatment during the calendar year 1899. Twenty-three were returned to duty, or to their homes, much improved, if on the retired list, after treatment extending over an average period of 64 days; 1 died, and 3 remained in hospital December 31, 1899.

Enlisted men's division.—One hundred and eighty cases were admitted during the year, which, with 48 remaining from 1898, make a total of 228 cases treated. One hundred and ten of these were returned to duty, 59 were discharged for disability, 15 by expiration of term of service or special orders, 2 died, and 42 remained under treatment December 31, 1899. Of those discharged on certificates of disability, 26 were cases of rheumatism and 11 of gunshot wounds.

Division of ex-volunteers.—Under regulations prescribed by the Surgeon-General of the Army, and approved by the Secretary of War, ex-volunteers of the war of the rebellion have been admitted to this hospital since May 10, 1897, and ex-volunteers of the Spanish-American war since November 9, 1898. During the year ending December 31, 1899, 175 permits were issued to ex-volunteers of both wars. One hundred and thirty cases availed themselves of this permission and were admitted for treatment. The remaining 45 permits were canceled, as the beneficiaries, for various reasons, could not take advantage of them. Most of those who were treated returned to their homes much benefited; 2 veterans of the civil war died in the hospital during the year; 16 cases remained under treatment December 31, 1899.

THE ARMY MEDICAL MUSEUM AND LIBRARY BUILDING.

This building was originally erected by an appropriation which comprised only 50 per cent of that called for by the estimates. It was, therefore, materially curtailed, not only in its proportions but in its conveniences for the ends in view. The growth of the collections has now reached a point where there is some embarrassment in properly caring for them. This is felt particularly in the library. One large room originally designed for library purposes has been diverted to the uses of the Record and Pension Office of the War Department, and is entirely removed from the control of this office. It is much needed for the display and care of the originals and duplicates of the library property, the latter of which are now so crowded in basement rooms as to be practically inaccessible. I therefore renew the request that the whole of the Museum and Library Building be devoted to its legitimate purpose.

ARMY MEDICAL MUSEUM.

The total number of specimens in the Army Medical Museum at the end of the fiscal year, June 30, 1900, was 35,420. The following statement shows in detail the additions and changes in the different sections:

Pathological section:	
In Museum June 30, 1899	11,631
Discarded	17
	11,614
Received during the year	263
In Museum June 30, 1900	11,877
Anatomical section:	
In Museum June 30, 1899	1,528
Discarded	1
	1,527
Received during the year	12
In Museum June 30, 1900	1,540

Section of comparative anatomy:	
In Museum June 30, 1899	1,432
In Museum June 30, 1900	1,432
Microscopical section:	
In Museum June 30, 1899	12,750
Added during the year	141
In Museum June 30, 1900	12,891
Miscellaneous section:	
In museum June 30, 1899	2,427
Discarded	1
	2,426
Received during the year	68
In museum June 30, 1900	2,494
Provisional pathological section:	
In museum June 30, 1899	2,063
Discarded	1
Returned to contributor	1
Transferred to other institutions	3
	5
In museum June 30, 1900	2,058
Provisional anatomical section:	
In museum June 30, 1899	895
Transferred to other institutions	139
In museum June 30, 1900	756
Photographic series:	
In museum June 30, 1899	2,312
Received during the year	60
In museum June 30, 1900	2,372

RECAPITULATION.

Specimens in the museum June 30, 1899	35,039
Discarded, transferred, etc	163
	34,876
Added during the year	544
Specimens in museum June 30, 1900	35,420

The following are some of the more interesting specimens added to the museum collection during the past fiscal year:

11727. Typhoid ulceration of ileum with perforation and peritonitis; from a soldier. Contributed by Acting Asst. Surg. J. J. Curry, U. S. A.

11855–11873. Series of 17 specimens of typhoid fever, and 2 of amœbic dysentery; from soldiers at Fort McPherson, Ga., during Spanish-American War. From post-mortem examinations made by Acting Asst. Surg. R. Norton, U. S. A. One of the fever specimens shows healing, 5 show perforations, 1 was complicated with ulceration of larynx, 1 with parotitis, and 1 with malaria.

11852. Head of an infant showing pseudencephalus. Contributed by Dr. V. B. Jackson, Washington, D. C.

11844–11846. Solitary tubercle of brain of child 9 years old, which had had epileptic fits and died in convulsions. The suprarenal capsules were also tubercular. Contributed by Dr. G. N. Acker, Washington, D. C.

11935–11936. Sarcoma of cerebellum and lung, and tuberculosis of lung, from a woman aged 50, who had also a cancerous breast removed. These conditions were all verified by microscopical examination. Contributed by Dr. D. S. Lamb, Washington, D. C.

11945. Skullcap of boy 5 years old, showing healing after trephining for traumatic epilepsy, which was thereby relieved. The boy was afterwards accidentally killed. Contributed by Acting Asst. Surg. James S. Kennedy, U. S. A.

11726. Aneurism of abdominal aorta which ulcerated and perforated into duodenum; from a soldier who died suddenly. The case was complicated with a malarial spleen, chronic interstitial nephritis, tubercular mesenteric glands, and general arterio-sclerosis. Contributed by Acting Asst. Surg. J. J. Curry, U. S. A.

11812–11813. Aneurism of popliteal artery; femoral artery tied; failure of collateral circulation; gangrene of foot and lower leg, requiring amputation. The colors in the grangenous limb have been beautifully preserved by the Kaiserling method. From an old soldier. Contributed by Maj. L. A. La Garde, surgeon, U. S. A.

11982. Aneurism of arch of aorta which ruptured and caused sudden death. A large pouch opening by a small aperture into the arch. From a soldier. Contributed by Capt. E. A. Mearns, assistant surgeon, U. S. A.

11920–11921. Acute tuberculosis of pericardium and spleen, from a man aged 32. Contributed by Dr. D. S. Lamb, Washington, D. C.

11877–11878. Acute vegetative endocarditis, with chronic pericarditis, and large embolic infarctions of spleen and kidneys; from a woman aged 26. There was a history of rheumatism. Contributed by Dr. D. S. Lamb.

11849–11850. Vegetative endocarditis of both sides, with large embolic infarction of the spleen. From a woman aged 26, who had suffered from rheumatism. Contributed by Dr. H. M. Newman, Washington, D. C.

11853. Cancer of larynx. Contributed by Dr. T. C. Smith, Washington, D. C.

11919. Cancer of œsophagus. Contributed by Dr. W. W. Johnston, Washington, D. C.

11834. Mesenteric hernia, which became strangulated and caused death in a man aged 24. Contributed by Dr. D. S. Lamb, Washington, D. C.

11883–11886. Large retroperitoneal tumor, conjoined with strangulated internal abdominal hernia, which caused death in a man aged 45. Contributed by Dr. D. S. Lamb, Washington, D. C.

11814. Amœbic abscess of the liver. Contributed by Dr. G. N. Acker, Washington, D. C.

11924. Gas bacillus dilatation of hepatic vessels; from a woman. Contributed by Acting Asst. Surg. James Carroll, U. S. A.

11937. Atrophy of kidneys with dilatation; right ureter nearly impervious; bladder contracted and ulcerated; prostatic portion of urethra ulcerated; from a soldier who had had cystitis and died of peritonitis. Contributed by Dr. Robert Pillow.

11933. Kidney showing atrophy and dilatation apparently caused by ureteral calculus. Removed by operation from a woman aged 38. Recovery. Contributed by Dr. J. W. Bovee, Washington, D. C.

11984. Kidneys showing hemorrhages into cortex; from a soldier who had gonorrhea. Contributed by Maj. W. C. Borden, surgeon, U. S. A.

11935. Chronic hemorrhagic inflammation of kidney; from a man aged 70. Contributed by Dr. D. S. Lamb, Washington, D. C.

11983. Calculi removed by operation from the kidney of a soldier. Contributed by First Lieut. J. H. Ford, assistant surgeon, U. S. A.

11728. Calculus weighing 190 grains removed from the bladder of a boy aged 5 years. Superpubic cystotomy. Recovery. Contributed by Dr. J. Ford Thompson, Washington, D. C.

11882. Fungoid growth of penis from chronic inflammation; amputation. Recovery. From a soldier aged 26 who had had chancroid and phymosis. Contributed by Acting Asst. Surg. W. T. Baird, U. S. A.

11836. Testicle, weighing 32 ounces and measuring 7.5 by 4 by 3.5 inches, of a horse 10 years old; removed for cancer. Recovery. Contributed by D. E. Buckingham, veterinary surgeon, Washington, D. C.

11941. Large cyst of Fallopian tube. Removed by the contributor, Dr. J. W. Bovee, Washington, D. C.

11874. Ankylostomum duodenale. From one of a series of cases observed in Porto Rico by the contributor. First Lieut. B. K. Ashford, assistant surgeon, U. S. A.

11725. The bones of a case of mycetoma of leg and foot; showing cavities filled with actinomyces. Contributed by Acting Asst. Surg. J. T. Arwine, U. S. A.

11745–11774 and 11903–11913. Series of 41 models showing the rarer forms of disease of the skin. Made and colored by Dr. J. Baretta, of the St. Louis Hospital, Paris. Purchased.

11946. Odontoma, weighing 3 pounds, from a 9-year-old horse whose jaw had been broken in early life. The tumor developed as a consequence. Purchased.

11947–11952. Artificial dentures carved of hippopotamus tusk and ivory in Paris previous to 1854. Contributed by Dr. James Gordon, St. Thomas, Danish West Indies.

11956–11960. Old-fashioned artificial dentures of ivory. Contributed by Dr. A. E. N. Lister, Lincoln, England.

11969–11970. Peculiar bridge work made by a Mohammedan goldsmith in the East Indies. The teeth are stained from chewing betel nut. Contributed by Dr. J. W. Egbert, Madras, India.

11980–11981. Plaster casts of dentures of Crow and Cheyenne Indians, showing entire absence of disease, which the contributor attributes to a purely meat diet. Contributed by Dr. W. A. Allen, Billings, Mont.

11739. Ivory denture made at Toronto, Canada, about one hundred years ago. Contributed by Dr. W. A. Campbell, Brooklyn, N. Y.

11794. Ivory dentures made in 1849 by Dr. Theo. Chupein, now of Philadelphia, Pa.

11818–11821. Plaster casts of dentures to illustrate the mechanism of retracting and retaining the side teeth. Contributed by E. S. Fuller, Piqua, Ohio.

11824–11829. Japanese artificial dentures made of wood; some with white stones to represent teeth; the stones are blackened when a woman is married. The molar region shows rows of nail heads. Contributed by Dr. A. G. Smith, Yokohama, Japan.

11876, 11890, 11894, and 11895. Plaster casts of dentures to show shape of hard palate in mouth breathing. Contributed by Dr. M. C. Smith, Lynn, Mass.

11897. Plaster casts of dentures showing destruction of palate and alveolar arches by lupus. Contributed by Dr. M. C. Smith, Lynn, Mass.

11808. Bird shot embedded for twenty years in the neck of a tooth. Contributed by Dr. E. E. Slaton, Eclectic, Ala.

LIBRARY OF THE SURGEON-GENERAL'S OFFICE.

The following table shows the additions made to the library during the fiscal year 1899–1900:

Description.	On hand June 30, 1899.	Added during fiscal year.	Total June 30 1900.
	Volumes.	*Volumes.*	*Volumes.*
Medical journals	39,094	1,324	40,418
Medical transactions	6,153	139	6,292
Bound theses	1,989	65	2,054
Bound pamphlets	2,670	84	2,754
Other medical books	81,966	2,411	84,377
Total	131,872	4,023	135,895
Medical theses	[1]61,120	1,846	62,966
Medical pamphlets	61,775	5,250	67,025
Total	122,895	7,096	129,991

[1] Of the total number of theses on hand June 30, 1899, there were 828 bound in 65 volumes, and 646 pamphlets bound in 53 volumes during the year.

There were presented to the library during the year 557 books and 8,740 pamphlets and journals.

Volume V, second series, of the Index Catalogue, includes the letters "E" and "F" from "Enamel" to "Fyuner," and forms a volume of 1,127 pages. It will be ready for distribution at the usual time. The appropriation for Volume VI, second series, having been made, the manuscript is in course of preparation for the printer.

MEDICAL OFFICERS.

UNITED STATES ARMY.

An army medical board convened by Special Orders, No. 15, Adjutant-General's Office, January 18, 1900, at Manila, P. I., approved 16 candidates, 1 of whom died before the report of the board was received.

Another board convened by Special Orders, No. 81, Adjutant-General's Office, April 6, 1900, at Havana, Cuba, examined 15 candidates during its session from May 1 to 28, 1900; 4 of these were approved, 10 were rejected as disqualified professionally, and 1 withdrew after partial examination.

Appointments.—None during the year.

Promotions.—One deputy surgeon-general with the rank of lieutenant-colonel to be assistant surgeon-general with the rank of colonel; 3 surgeons with the rank of major to be deputy surgeons-general with the rank of lieutenant-colonel; 5 assistant surgeons with the rank of captain to be surgeons with the rank of major.

Vacancies.—Twelve.

Deaths.—One surgeon with the rank of major; 1 assistant surgeon with the rank of captain (chief surgeon United States Volunteers with the rank of major); 1 assistant surgeon with the rank of first lieutenant.

Retirements.—One assistant surgeon-general with the rank of colonel; 2 deputy surgeons-general with the rank of lieutenant-colonel; 1 surgeon with the rank of major; 1 assistant surgeon with the rank of captain, retired with the rank of major.

Wholly retired.—One assistant surgeon with the rank of captain.

Resigned.—One assistant surgeon with the rank of captain.

Dropped from the Medical Department United States Army, having failed to accept commission.—One assistant surgeon with the rank of first lieutenant.

The Medical Department consists at present of 192 officers, a number which barely sufficed for the needs of the Army before the outbreak of the late war with Spain, and which proved utterly inadequate in number, notwithstanding the earnest efforts of its members to form a satisfactory basis of organization, for the large increase made to our military forces during the progress of that war. Similarly since the close of the war it has been impossible for the Medical Department, without professional assistance from civil life, to provide for the sanitary and medical work at the large number of new posts and stations that have been established at home for coast defense, in Cuba, Porto Rico, and Hawaii for garrison duty, and for the military operations in the Philippine Islands.

Excellent assistance has been obtained by contract with civil physicians, so far as concerns the professional care of the sick and wounded, but much experience is required to fit these medical men for the sanitary work of their position and to familiarize them with army methods. Most of them are young men with no knowledge of military hygiene or medical administration. They accept contracts for a year to see the world or gain professional experience, but not with a view to become expert military sanitarians. They are therefore not qualified to perform successfully many of the duties incumbent upon them. To be an efficient army medical officer, one should be able not only to prescribe for the sick and perform surgical operations, but to point out and remedy all causes tending to produce disease, and to inculcate the spirit of military discipline without which army nurses and attendants are useless. This can not be expected from young civilian physicians whose service in the Army is casual and temporary. On the other hand, the young man who desires to be permanently attached to

the medical service of the Army devotes his whole energies to perfect himself for the work of his life. A lieutenant and assistant surgeon of the Regular Army has therefore, as a rule, much higher qualifications than the young physician under contract. The desirability of a large increase in our regular medical establishment is obvious. It has been heretofore recommended by me and I trust that favorable action will soon be taken by Congress in this important matter.

In the following letter, dated November 29, 1899, I called attention to the insufficiency of the Medical Department and urged legislation to increase its efficiency by adding to its numbers and providing a probationary period during which candidates for appointment, selected by an examining board in accordance with existing regulations, should be required to undergo a course of instruction to fit them for their duties as army medical officers:

[Subject: Bill for an increase in the Medical Corps of the Army.]

WAR DEPARTMENT, SURGEON-GENERAL'S OFFICE,
Washington, November 29, 1899.

SIR: I have the honor to transmit herewith a bill for the increase of the Medical Department of the Army. This increase is very urgently needed, and the number of additional medical officers asked for is very reasonable in view of the greatly increased demands upon the Medical Department during the past two years. The Medical Corps of the Army at present consists of 192 commissioned medical officers, but the requirements of the service are such that at the present time there are over 400 physicians in service as acting assistant surgeons under contracts made with the Surgeon-General of the Army. The number of medical officers was insufficient for our Army of 25,000 men on a peace basis prior to the Spanish-American war. At the present time a large number of posts have been established upon the seaboard of the United States, in Porto Rico, in Alaska, and the Hawaiian Islands, which, presumably, will be permanently garrisoned hereafter. There are at present garrisons at 18 new posts (upon the seaboard) in the Department of the East alone, and in the Department of the Columbia, including Alaskan posts, there are 10. The number of independent garrisons in Porto Rico at present is 11; the number of independent commands in Cuba is 30. At the present time there are stationed in the Philippine Islands, or under orders to report for duty to the commanding general, Department of the Pacific, 52 medical officers of the Regular Army, 23 surgeons of volunteers, 75 regimental surgeons and assistant surgeons of volunteer regiments, and 157 acting assistant surgeons. How many medical officers may be required for duty with troops constituting the permanent garrisons of these islands it is impossible to say at the present time; but there can be no doubt that if the number of medical officers of the Army called for in this bill is authorized by Congress it will still be necessary, for many years to come, to employ a considerable number of contract surgeons to meet the requirements of the service.

It is important in the interests of the service that the Medical Department should have a sufficient number of commissioned officers who have been carefully examined as to their physical and professional qualifications for the service, and who, as the result of special training received in the service, have become familiar with their duties and responsibilities, not only as physicians and surgeons, but as medical officers of the Army. It is also just and proper that those acting assistant surgeons and commissioned medical officers of volunteer regiments who have done good service and have the necessary qualifications, should have the way opened to them to obtain commissions; and it is evident that those who would be the most desirable acquisitions to the service can not afford to remain indefinitely under a contract which may be terminated at any moment, and which affords no prospect of advancement.

In view of the facts stated, I respectfully urge the importance of an increase of the Medical Department of the Army, as provided in the inclosed bill, at the earliest practicable date.

Very respectfully,

GEO. M. STERNBERG,
Surgeon-General, United States Army.

THE SECRETARY OF WAR.

BILL for the increase of the Medical Department of the Army.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That there shall be added to the number of medical officers of the Army now authorized by law, four assistant surgeons-general with the rank of colonel; ten deputy surgeons-general with the rank of lieutenant-colonel; thirty surgeons with the rank of major; and eighty assistant surgeons with the rank of first lieutenant, who shall have the rank of captain at the expiration of five years' service, as now provided by law: *Provided*, That the original vacancies created by this act in the grade of colonel, lieutenant-colonel, and major shall be filled by seniority promotion in accordance with established laws and regulations.

SEC. 2. Hereafter, candidates for appointment in the Medical Corps of the Army who pass a medical examining board in compliance with existing regulations shall be appointed acting assistant surgeons for a probationary period of six months. During this probationary period they shall attend the Army Medical School established at the Army Medical Museum in the city of Washington, and the faculty of the Army medical school shall report to the Secretary of War at the end of the prescribed course of instruction upon the fitness and relative standing of the probationary candidates; those who are recommended by the faculty may then be commissioned by the President to fill existing vacancies in the Medical Corps of the Army.

SEC. 3. Acting assistant surgeons appointed in accordance with the provisions of section two shall be paid one hundred dollars per month, and shall not be entitled to any allowances or to mileage in reporting for the prescribed course of instruction, or in returning to their homes if they are not recommended for a commission.

SEC. 4. The number of acting assistant surgeons appointed in accordance with the provisions of section two shall not exceed the number of vacancies existing or to result from retirements during the probationary period.

SEC. 5. Candidates who have rendered satisfactory service as acting assistant surgeons, or as commissioned medical officers in the Volunteer Army of the United States for a period of six months or more, shall be exempted from this period of probation and may be commissioned at once if vacancies exist and they pass a satisfactory examination as to their physical, moral, and professional qualifications.

This bill is intended to provide only for an increase in the Medical Corps absolutely necessary for the medical care of the regular troops now in service. If the Army should be increased to 100,000 enlisted strength, a corresponding increase in the Medical Corps would be required, and I have submitted to the honorable the Secretary of War the draft of a bill providing for a suitable medical corps for an army of that size under existing conditions.

UNITED STATES VOLUNTEERS.

During the year 9 appointments have been made as surgeons, United States Volunteers, with the rank of major; 7 of the appointees were from the Regular Army and 2 were acting assistant surgeons, United States Army.

Died.—One chief surgeon with rank of major and 1 surgeon with the rank of major.

At the end of the year there remained in service 34 surgeons with the rank of major, 11 of whom were captains in the regular establishment.

REGIMENTAL SURGEONS AND ASSISTANT SURGEONS, UNITED STATES VOLUNTEERS.

On June 30, 1900, there were 78 regimental surgeons and assistant surgeons in the service—25 majors, 13 of whom were captains in the Regular Army; 27 assistant surgeons with the rank of captain, and 26 assistant surgeons with the rank of first lieutenant.

Deaths.—One lieutenant and assistant surgeon.

These regimental medical officers were appointed in accordance with the provisions of the act of Congress approved March 2, 1899 (an act for increasing the efficiency of the Army and for other purposes). (Chap. 352, Statutes at Large, vol. 30.) Three medical officers were commissioned for each volunteer regiment, one with the rank of major, one with the rank of captain, and one with the rank of first lieutenant. It was the evident intention of Congress that these medical officers should have the pay of the rank respectively held by them, but by a decision of the Comptroller of the Treasury the medical officer commissioned by the President as a captain can receive only the pay of a first lieutenant, and the Paymaster's Department of the Army has necessarily been ruled by this decision. The medical officers who accepted these positions had seen previous service in the war with Spain. Some of them had been brigade surgeons and others regimental surgeons with the rank of major. When they were offered commissions as assistant surgeons with the rank of captain there was no reason to suppose that they would not be paid as captains. I therefore recommend Congressional action to insure to these officers the pay of a "captain, mounted," from the date of their acceptance of such commissions.

ACTING ASSISTANT SURGEONS, UNITED STATES ARMY.

There were in service June 30, 1899, 389 acting assistant surgeons. During the year ended June 30, 1900, contracts were made with 434 physicians, while 358 contracts were annulled and 3 terminated by death, leaving in service June 30, 1900, 462 under contract. Of this number 121 were on duty in the United States, 22 on transports, 10 in Porto Rico, 60 in Cuba, and 249 in the Philippine Islands.

The following tabulation shows the number of contracts with physicians made and annulled from April 17, 1898, to June 30, 1900:

	Out of service.	In service.	Total.
Served under 1 month	34	15	49
Served 1 to 6 months	339	87	426
Served 6 to 12 months	144	73	217
Served 1 to 2 years	78	250	328
Served over 2 years	1	37	38
Total	596	462	1,058

Total number serving in 1898–99	855
Daily average serving in 1898–99	439
Total serving in 1899–1900	618
Daily average serving in 1899–1900	415

Average service of 596 now out of service, five months and twenty-six days.
Average service of 462 now in service, one year and three months.
Average service of 1,058 acting assistant surgeons, nine months and twenty-six days.

All the contract surgeons now in service have been examined by boards of medical officers constituted by me to determine their fitness, physical and professional, for the discharge of their duties. The above tabulation shows, however, that a sufficient inducement is not held out to retain these medical men in service. Out of a total of 1,058 under contract since April 18, 1898, 373 served only six months or less. This is a serious loss to the Department, as it takes about that length of time to familiarize the civilian surgeon with the duties of his new

sphere of action. As an inducement for these contract surgeons to remain in service, and as a reward for those who have continued in service for a year or more, I recommend that the commission of assistant surgeon of volunteers be granted them, as provided in a bill which I submitted on April 4, 1900, as follows:

A BILL for the appointment of assistant surgeons of volunteers.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That "contract surgeons" who have rendered faithful and satisfactory service with the Army of the United States for a period of one year, and who have passed a satisfactory examination as to their physical and professional qualifications, shall be commissioned by the President as assistant surgeons of volunteers, with the rank of first lieutenant, subject to honorable discharge from the service whenever their services are no longer required.

SEC. 2. That at the end of two years' service as first lieutenants assistant surgeons of volunteers, appointed in accordance with section one of this act, who have rendered faithful and satisfactory service, shall be commissioned by the President as assistant surgeons of volunteers, with the rank of captain, subject to honorable discharge from the service whenever their services are no longer required; and that they shall receive the pay of a captain mounted.

ARMY MEDICAL SCHOOL.

This school was closed during the school year 1899–1900, as existing conditions in the Medical Department rendered it impracticable to carry out the usual school programme.

BOARDS FOR THE STUDY OF TROPICAL DISEASES.

On my recommendation a board of medical officers, consisting of First Lieut. Jere B. Clayton, assistant surgeon, United States Army; First Lieut. Richard P. Strong, assistant surgeon, United States Army, and Acting Asst. Surg. Joseph J. Curry, was appointed to meet at one of the general hospitals in or near Manila, P. I., to be designated by the commanding general, Department of the Pacific, upon the recommendation of the chief surgeon of the department, for the purpose of studying tropical diseases as they occur in those islands. It was my desire that this board should be given all the appliances and assistance necessary for conducting their researches and every opportunity for obtaining access to cases and making autopsies, etc. In my letter of instruction to the chief surgeon I stated that the members of the board need not necessarily work in the same laboratory, and while pursuing their general investigations they could make blood examinations and bacteriological researches for the purpose of clinical diagnosis as well as with a view to the promotion of our knowledge of infectious diseases prevailing in the Philippines. I stated that if stationed at different hospitals the members of the board should meet occasionally for consultation.

Each member should make an independent report of investigations conducted by him and of the general result of his blood examinations, etc. A quarterly report of progress should be made by each member of the board, which should indicate the nature of the work in which he has been engaged and the results attained. Full and detailed reports relating to particular diseases investigated will be made by the individual members of the board whenever they are prepared to submit such reports.

Special attention should be given to tropical dysentery, to the malarial fevers prevailing in the Philippines, to beri-beri, to intestinal parasites, and in general to all tropical diseases the etiology of which has not been completely worked out.

Some excellent work was done by the members of this board and their associates in the laboratories of the large hospitals. See, for instance, infra page 245, under the heading of "Dysentery."

Another board was appointed to meet at Camp Columbia, Quemados, Cuba, in May, 1900, for the purpose of pursuing scientific investigations with reference to the infectious diseases prevailing in the island of Cuba. This board consisted of Maj. Walter Reed, surgeon, United States Army, and Acting Asst. Surgs. James Carroll, Aristides Agramonte, and Jesse W. Lazear, United States Army.

The instructions to Major Reed, president of this board, included the following:

> You will naturally give special attention to questions relating to the etiology and prevention of yellow fever. As you are familiar with what has already been done by other bacteriologists in this field of investigation, I do not consider it necessary to give you any suggestions or detailed instructions. But it is evident that the most important question which will occupy your attention is that which relates to the etiology of this disease.
>
> You will also take advantage of such opportunities as may offer for the study of other infectious diseases, and especially of the malarial fevers prevailing in the island of Cuba. An important question in connection with the diseases of tropical and semi-tropical countries relates to the etiology of febrile attacks of short duration, to which strangers are especially subject. Should you have time, there will be ample opportunity for the study of leprosy in the leper's hospital in the city of Havana. Attention should also be given to the infectious diseases of the lower animals, in case any such prevail, the etiology of which has not been definitely determined.
>
> You are authorized to obtain from the medical supply depot in Havana such articles as you may require, upon requisitions approved by the chief surgeon, Division of Cuba. Necessary articles not on hand in that depot should be called for upon special requisitions to be sent to this office.

It is with regret that I have to report the death of one of the members of this board while in the discharge of his duty under the above instructions. Acting Asst. Surg. Jesse W. Lazear died of yellow fever September 25, 1900, at Columbia Barracks, Quemados, Cuba. Acting Asst. Surg. James Carroll, another member of this board, suffered from a severe attack of the disease, but fortunately recovered.

THE HOSPITAL CORPS.

At the close of the fiscal year ending June 30, 1899, the Hospital Corps consisted of 189 hospital stewards, 287 acting hospital stewards, and 2,892 privates, a total of 3,368. During the fiscal year ending June 30, 1900, the gain to the corps was 2,272 men, of whom 1,490 were obtained by the enlistment of civilians, 282 by reenlistment, and 500 by transfer from the line. The corps lost during the same period 1,549 men, the greater part of them by discharge. It is worthy of note that 88 were discharged on certificates of disability, 2 were killed in action, 1 was reported missing, and 27 died of disease. The number of Hospital Corps men in service June 30, 1900, was 167 hospital stewards, 381 acting hospital stewards, and 3,543 privates, a total of 4,091.

Hospital stewards.—The number of hospital stewards decreased during the fiscal year from 189 to 167, it being impossible to fill vacancies as they occurred, inasmuch as the number of hospital stewards considerably exceeded the allowance of 100, which was the number authorized before the war with Spain, the increase in this grade authorized in 1898 having been for the war only. However, by the act of Congress approved May 26, 1900 (published in General Orders, No. 76, Head-

quarters of the Army, June 1, 1900), 100 additional hospital stewards were allowed. An examination is about to be held to fill the vacancies thus created.

Acting hospital stewards.—Owing to the wording of section 7 of the act of Congress approved March 1, 1887, which established the Hospital Corps, the status of the acting hospital steward has been uncertain. He was, in point of fact, a noncommissioned officer. The wording of the law appeared to provide that the acting steward should be a private temporarily detailed rather than a true noncommissioned officer. The rulings of the accounting officers of the Treasury in regard to this matter in individual cases have varied, but the question having now come up with especial prominence, in view of the fact that several acting hospital stewards have been placed upon the retired list, a general decision was rendered for the first time by the Comptroller of the Treasury on April 16, 1900 (published in Circular No. 231 of Paymaster-General's Office, April 19, 1900), in which it was decided that an acting hospital steward is a true noncommissioned officer, and is entitled to travel pay and extra pay as such, and not as a private, and when retired is entitled to 75 per cent of the pay and allowances of his grade.

In the volunteer regiments organized during the year 1899, hospital stewards (three in number for each regiment) were noncommissioned officers of the regiment, and the regulations prescribed for the organization of these regiments directed that candidates for appointment as hospital stewards should be required to produce certificates of efficiency from a reputable college of pharmacy. Experience in the summer of 1898 having shown, however, the great necessity that there should be a noncommissioned officer of the Medical Department with each regiment, who should be familiar with the preparation of reports and returns, in order that the proper medical statistics should be kept and that the enlisted men of the Hospital Corps should be properly accounted for, it was informally arranged that one of the volunteer stewards for each regiment should be secured by the appointment of an acting hospital steward of the Regular Army to that position. Experienced and capable acting hospital stewards were accordingly appointed to these positions upon my recommendation. The benefits of this course have been apparent from the orderly manner in which the records of the Medical Department in the volunteer service have been kept.

Schools of instruction.—The schools of instruction at Washington Barracks, D. C., and Angel Island, Cal., have been continued during the fiscal year, 726 men having been instructed at Washington Barracks and 692 at Angel Island. The greater part of these men have been sent to the Philippines. A school of instruction has also been established at hospital No. 3, Manila, P. I., and until the military hospital No. 1, Havana, Cuba, was given up, a training school was in successful operation at that hospital.

A large number of hospital corps men of all grades have been commended by surgeons with whom they were serving. Of many of these mention is made in the reports embodied in this volume. The chief surgeon, Department of the Visayas, reports that he never knew of a hospital corps man who failed in his duty in any way under fire. An experience with the most formidable diseases, such as yellow fever and the bubonic plague, has also shown that the men of the Hospital Corps are always ready to expose themselves with cheerfulness to

dangers which are rightly more dreaded than those of the battlefield. Where so many have done well it would appear invidious to make distinctions, and doubtless many acts of heroism have never been reported to me. An amputation performed by Privates Samuel Jones and Henry Becker,[1] of the Hospital Corps, is, however, particularly worthy of note as an evidence of courageous and judicious performance of duty in an emergency, for which they had received no special training. On January 27, 1900, a certificate of merit was awarded to Private Philip M. Beyerl, Hospital Corps. On November 13, 1899, while on duty on the hospital ship *Relief*, an insane patient having eluded his attendant and jumped overboard, Private Beyerl sprang after him without a moment's hesitation, and, although the night was dark and the bay rough, succeeded in reaching the patient and supported him until a boat came to his assistance. A certificate of merit was also awarded on June 14, 1899, to Private Harry Shields, Hospital Corps, for distinguished conduct in the flood at Brackettsville, Tex. General Orders, No. 15, Adjutant-General's Office, February 13, 1900, publishes the name of one hospital steward and six privates of the Hospital Corps, whose conduct was especially meritorious in voluntarily nursing yellow-fever patients at Fort Barrancas, Fla., during the epidemic which prevailed at that post in November, 1897.

ARMY NURSE CORPS.

The number of female nurses in the Army Nurse Corps has remained approximately constant during the year, there having been 187 in the service July 1, 1899, and 210 on June 30, 1900; 165 contracts were made and 149 were annulled. The movement of troops to the Philippines has occasioned a corresponding movement of nurses, and 122 are there now, against 33 at the beginning of the year. Female nurses have recently left Honolulu and the hospital ship *Relief*, but are serving in increasing numbers on the army transports in the Pacific.

The number of nurses in the United States was temporarily increased in the autumn of 1899, but otherwise remained nearly the same, having been 65 a year ago and 60 at present. They are now stationed at the general hospitals at the Presidio of San Francisco, Cal., and Fort Bayard, N. Mex., at two post hospitals, and at the school of instruction for the Hospital Corps at Angel Island. No nurses remain in Porto Rico at present, and their number in Cuba has been reduced from 76 to 16.

The organization of the Army Nurse Corps has been steadily improved and its adjustment to the Army made more satisfactory in details. The work of the nurses continues to be highly appreciated and their services are in demand at almost all hospitals of importance.

The regulations governing the Army Nurse Corps which were published in a circular from this office June 20, 1899, approved by the Secretary of War, were reissued March, 9, 1900, with but two important changes. Appointments are now limited to citizens of the United States, this provision being waived only in the cases of those who have previously served (and then only if they have legally declared intention of becoming citizens). The leave of absence authorized, which was previously in the proportion of thirty days for each year of past service, is now thirty days in each calendar year, regardless of length of service.

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[1] Report of the chief surgeon, Department of the Visayas, p. 160.

The use of the nurses at the hospital corps schools as instructors in the preparation of food for the sick continues as reported last year, and has been most successful. The nurse at Angel Island is under contract as one of the Army Nurse Corps, but the nurse at Washington Barracks, is for local reasons, now classed as a civilian employee.

There has been no death among the nurses in service during the year.

MEDICAL AND HOSPITAL SUPPLIES.

Military emergencies, which have controlled the medical supply of the Army for several years, continue to influence the operations of the department having it in charge. Sudden and unforeseen demands, such as those made by the relief force recently sent to China, necessarily disturb the most liberal provision for known conditions, and compel the consideration of an ample margin of safety. Happily, in this instance the medical supply in Manila was sufficient, not only to provide for the troops immediately employed, but to meet the estimated wants of an increased force for a considerable period. Such contingencies, and the evident propriety of maintaining a large medical supply on the Pacific coast, have led to the enlargement, now in progress, of the medical supply depot at San Francisco, so that it may contain supplies for 100,000 men for six months. With a corresponding provision in New York, and the holding at St. Louis of supplies sufficient for 20,000 men for the same period, great capacity for issue will be insured, whether for emergency or routine supply.

New York is, and will probably continue to be, our cheapest purchasing market, and that most available for the distribution of supplies, so that it has been my aim to free the supply depot at that place as far as possible from the interruption of minor issues to posts at home, and enlarge its ability to meet calls from abroad. To this end its home territory has been restricted to the posts on Lake Ontario and the Atlantic seaboard. The number of posts, including arsenals, in this area is 52. In this way this depot has been free to deal with issues to Cuba, Porto Rico, and the larger part of the very extensive supply needed in the Philippines.

A like restriction of the near work of the San Francisco depot to the 20 posts in the departments of the Columbia and California has enabled that depot to deal satisfactorily with the issues to Alaska and the Sandwich Islands, as well as to contribute largely and quickly to an unexpected demand, such as that of the China relief expedition, and to restore withdrawals from Manila. As above noted, it is my desire to enlarge the capacity of this depot in order to give greater security in meeting emergency demands.

This narrowing of the territory of the depots at New York and San Francisco has greatly enlarged the area of supply for the depot in St. Louis, so that it now has 52 dependent posts distributed through the country from the Canadian to the Mexican border and the Gulf of Mexico, and from the Alleghenies to the Rocky Mountains. It is considered that this control of supply will prove satisfactory.

The diminution of the forces in Cuba and Porto Rico has enabled me to close several of the minor depots in those islands, so that only two remain in active operation—one of large storage in Havana and a small supply in San Juan.

The unusual military conditions existing in the Philippine Islands, the multiplication of posts and garrisons, the demands connected with

an impoverished and unsanitary people, and the unfamiliarity with military restrictions and proper responsibility for public property of many of the medical officers temporarily employed have resulted in large requisitions for medical supplies from that quarter, so that it is not yet possible to determine with strict accuracy what constitutes a normal provision for troops stationed in the Philippine Islands.

It has been my practice to allow the largest possible measure of independence to medical authorities in remote spheres of action, holding them to proper accountability; but in the execution of my responsibility I have made some few reductions in the large requests from Manila. With rare exceptions the supplies asked for have been sent as rapidly as the conditions of the market, due security of inspection, and opportunity for transportation would permit. At the same time the medical supply officer at Manila has been provided with ample funds and has been authorized to purchase, in the local market, any supplies urgently needed.

The enormous quantities of standard articles of supply which have been sent to the Philippines or purchased in Manila since January 1, 1900, will be appreciated by reference to the following list, which contains a few only of the articles furnished:

Bismuth, subnitrate (3 tons)	pounds	6,250
Cathartic pills, compound	number	2,900,000
Castor oil	quarts	12,471
Chloroform, in 100-gram bottles	bottles	16,465
Ether, in 100-gram tins	tins	15,000
Petrolatum spissum (16 tons)	pounds	31,930
Quinine tablets	tablets	23,750,000
Plaster, adhesive, 30 centimeters wide	meters	15,500
Bandages, roller	number	1,680,000
Gauze, plain	yards	270,000
Beef extract, in 100-gram tins	tins	41,200
Alcohol	quarts	39,750
Brandy	do	22,000
Whisky	do	16,000
Envelopes, official, large	number	115,000
Envelopes, official, letter	do	350,000
Envelopes, official, note	do	200,000
Pens	do	294,000
Clinical thermometers	do	18,067
Towels, hand	do	84,000
Pajamas, suits	do	28,336

This list might be extended, but my desire is simply to indicate the very large supply that is required for the present unusual service conditions, and to make plain the need for continuous effort to avoid an embarrassing deficiency.

In the matter of hospital stores I have felt called upon to exercise some restraint. The quantities asked for in the Philippines have been very large, and in view of the authorized allowance of 40 cents a day for the food of sick soldiers and the readiness of the Subsistence Department to furnish these supplies for sale, I have held that they can not be properly purchased by the Medical Department except for emergencies. I was and am still apprehensive that if these hospital stores are issued freely the light diet of the sick will habitually depend upon this emergency provision and not upon the allowance made by Congress.

A new table of medical supply is contained in the revision of the Manual for the Medical Department, now issuing from the press, and

it is expected that the changes made, chiefly in the addition of approved medicines, appliances, and material, as well as in an increased allowance, will result in meeting every reasonable demand and in avoiding irregular issues aside from those of emergency.

To our already extensive field equipment there has been added a very compact chest intended for the use of detachments serving in the field or independently elsewhere. The supply is calculated for a battalion and a period of six months. Three hundred and eighty-eight of these chests have been sent to the Philippines and are probably in service. Their cost is $114.81 each, including a compact operating case. The chests, five in each set, of the model of 1898 continue in service, and of these there are approximately 130 sets, also in the Philippines. The cost of each set is $477.61.

It is believed that our hospital equipment is fully abreast of every military necessity and compares favorably with that of other nations. Special requests for remedies, instruments, and apparatus are favorably considered if there is evidence that they will be helpfully employed.

The boards convened in Havana and Manila for the investigation of tropical diseases have been liberally supplied with the literature and material necessary for the prosecution of their work.

Since my last report 9 ice machines of large capacity, 3,000 to 4,000 pounds daily, have been sent to the Philippines for use in that military division, and 5 more are to be shipped as soon as finished by the manufacturers.

RECRUITING.

The total number of men examined for enlistment in the Regular Army during the year 1899 was 70,311, of whom 64,303 were white and 6,008 were colored. The number accepted was 47,899, or 681.24 out of every thousand examined. The ratio of accepted men was 677.36 for the white and 722.87 for the colored. White men to the number of 49 and colored men to that of 26.96 per thousand declined enlistment. The rate of rejection on primary examination was 273.64 among the white and 250.17 among the colored candidates, giving a mean of 271.64.

Of every thousand examined 74.56 were rejected on account of imperfect physique, including overheight, underheight, overweight, and underweight; 41.43 for diseases of the eye, 38.06 for diseases of the circulatory system, 26.53 for diseases of the digestive system, 22.43 for affections of the genito-urinary system, 17 for venereal diseases, 9.61 for hernia; while 9.81 were rejected as generally unfit or undesirable, 3.74 as minors, 3.12 on account of bad or doubtful character, and only 1.32 on account of illiteracy, imperfect knowledge of the English language, or mental insufficiency.

Of every thousand of the accepted men 855.61 were natives of the United States, 41.61 were born in Germany, 34.18 in Ireland, 17.14 in England, 11.55 in Canada, 6.58 in Sweden, 4.68 in Russia, the remainder in various other countries.

Recruiting returns for volunteers are not rendered to this office.

IDENTIFICATION OF DESERTERS AND OTHER UNDESIRABLE MEN.

During the year ending June 30, 1900, 9,718 transcripts of the identification cards of 5,318 delinquent ex-soldiers were filed among the classified descriptions of undesirable men, an average of 1.83 per man

as compared with 2.06 for the antecedent period, and 438 transcripts were canceled. On June 30, 1900, there remained 43,248 transcripts, an average of 2.20 each for 19,643 delinquent soldiers whose enlistment would be contrary to law.

June 30, 1899, 161,212 identification cards were on file for recruits and 5,549 for released military convicts and soldiers discharged dishonorably or without honor. The receipts for the following twelve months were 21,504 and 1,090, respectively, bringing the totals, June 30, 1900, up to 182,716 and 6,639.

From July, 1890, the time of the first identification, to June 30, 1900, 1,819 identifications have been made; 18 in 1890, 111 in 1891, 215 in 1892, 104 in 1893, 110 in 1894, 121 in 1895, 108 in 1896, 68 in 1897, 347 in 1898, 480 in 1899, and 137 during the first half of 1900.

HOSPITALS, POST AND GENERAL.

During the past year modern hospitals were completed at Fort Adams, R. I.; Madison Barracks, N. Y.; Fort Slocum, N. Y., and Fort Banks, Mass. Additional wards, kitchens, and dining rooms were added to the hospitals at Fort Ethan Allen, Vt., and Fort Porter, N. Y., and a new kitchen was added to the hospital at Fort Monroe, Va. The hospital at Mayaguez, P. R., was reconstructed, and the hospital at San Juan, P. R., was provided with new plumbing and otherwise improved. Plans and specifications were also prepared for a hospital at Santa Clara Barracks, Cuba.

New mortuaries of brick were erected for the hospitals at Washington Barracks, D. C.; Fort Wadsworth, N. Y., and Fort Crook, Nebr.

An additional ward for fifty beds and a new kitchen are in course of construction at the Army and Navy General Hospital, Hot Springs, Ark., and new hospitals are being erected at Fort Terry, N. Y.; Fort Preble, Me.; Fort Williams, Me.; Fort Strong, Mass.; Fort Leavenworth, Kans.; Fort Ontario, N. Y.; Fort Howard, Md.; Fort Du Pont, Del., and an important addition is being made to the hospital at Washington Barracks, D. C.

New quarters for hospital stewards were completed at Fort Snelling, Minn.; Fort Washington, Md., and at the Army and Navy General Hospital, Hot Springs, Ark. New quarters are now in the course of erection at Fort McDowell, Cal., and at Washington Barracks, D. C.

A general hospital or sanitarium for the treatment of officers and men of the Army suffering from pulmonary tuberculosis was established on my recommendation during the past year at Fort Bayard, N. Mex. Transfers of enlisted men suffering from this disease are made on the recommendation of medical officers of the Army forwarded through military channels. Discharged soldiers who are entitled to the benefits of the United States Soldiers' Home, Washington, D. C., are cared for at this establishment when sent by order of the board of commissioners of the Home, the expense for the maintenance of such soldiers being paid from the Soldiers' Home funds. On January 6, 1900, there were 47 patients under treatment at this sanitarium; on June 30, 83, and at the present date, October 17, 109.

The general hospital at Savannah, Ga., and the Josiah Simpson General Hospital at Fort Monroe, Va., were closed during the year, the necessity for their continuance having ceased. Besides the special hospitals at Hot Springs, Ark., and Fort Bayard, N. Mex., there are now in service in the United States only two general hospitals—one at

Washington Barracks, D. C., and the other at the Presidio of San Francisco, Cal. The one supplies the needs of the troops serving in the eastern part of the country, and is utilized as a training school for recruits for the Hospital Corps. The other receives sick men from organizations en route to the Division of the Philippines and patients sent from the hospitals in Manila for the benefit of the home climate. The following report describes the organization and management of this establishment:

REPORT ON THE UNITED STATES ARMY GENERAL HOSPITAL, PRESIDIO OF SAN FRANCISCO, CAL., FOR THE YEAR ENDING JUNE 30, 1900, BY MAJ. A. C. GIRARD, SURGEON, UNITED STATES ARMY, COMMANDING THE HOSPITAL.

History of the hospital.—When the Eighth Army Corps assembled at San Francisco, and during the period of its organization, the hospital service for the troops was performed under canvas at Camp Merritt, but the climate proving unfavorable for this method of accommodation the new brick barracks at the Presidio were assigned for the purpose, pending suitable construction for hospital purposes. A general hospital was organized on December 1, 1898, in these buildings and steps were at once taken for the construction of a hospital. The plan most suited for the purpose was that of Mr. W. H. Willcox, an architect of San Francisco, and this plan was adapted to the needs of the military service under the supervision of Lieut. Col. J. V. D. Middleton, deputy surgeon-general, and Col. William H. Forwood, assistant surgeon-general, United States Army. Contracts were let early in 1899, and in May when I reported at this place I found the work well under progress. I was assigned as inspector for the Medical Department on these buildings. The location of the hospital has its advantages and disadvantages. The advantages are proximity to the city, to the post of the Presidio, and to the camps which were to shelter the troops assembling for duty in the Philippines and the volunteers returned therefrom. The disadvantages are exposure to the high winds and fogs of the Presidio, the low ground upon which it is located, and the proximity to the liquor shops adjoining the Presidio. On July 1, 1899, I was assigned as commanding officer of the hospital. I had utilized the time I was acting as inspector to make provision for the equipment of the hospital from the supply depot and for the purchase of such articles as are usually not provided by the Medical Department. Shortly after the equipment of the hospital the number of its inmates was suddenly raised from 289 to 1,040, not only filling the wards in the new hospital, but two of the brick barracks and four of the wooden barracks at the post, which in great haste had to be supplied with the necessary equipment. Since then the average occupancy of the hospital has necessitated the continued use of the buildings at the post, as the new hospital had an accommodation of only 380 beds. Pending the introduction of a steam plant, which at first when the plans were prepared had been considered unnecessary and which I applied for soon after my arrival, the buildings had to be heated by coal stoves, where pipes could be passed through ridge ventilators, which was possible in the wards and dining rooms. All the other rooms which had not been fitted with flues had to be heated by coal-oil heaters, of which 100 were provided, as they are needed in this climate in every living room almost every day of the year. The steam plant was finally allowed and is now in course of construction and will be described hereafter.

Description of the buildings.—The general plan of the hospital can best be described as a quadrangle formed by a veranda, onto which abut all the buildings, except the administration building, which occupies a greater part of the front, with on either side the buildings for male and female nurses. The five wards abut on the veranda on each side. At the lower side it is traversed by the dining room and kitchen buildings; in the center and at either corner the quartermaster, commissary, and baggage buildings on one side, and the hospital corps dining room, and kitchen on the other. The buildings are framed with redwood weatherboarding, elevated above the sloping ground from 5 feet in the upper buildings to 20 in the lower; basements inclosed with latticework, with the exception of those of the three last-mentioned buildings, which are converted into rooms.

The administration building is a two-story building intersected in the center by cross and longitudinal halls dividing the building into front and rear rooms. To the right of the front hall are the two rooms assigned to the executive officer, 13 by 16 feet each. The next room, 13 by 16 feet, is used for a medical library, and the corner room, 17 by 17 feet, for the office of the commanding officer, and the room back of this, 12 by 13 feet, for the office of the chief nurse. On the left of the entrance the first room, 13 by 16 feet, information bureau; the next room, 13 by 16 feet, officer of

the day; next room, 13 by 16 feet, stenographer's room and closets for records; and the large corner room, corresponding to the commanding officer's and chief nurse's room combined, is used for the record clerks. After passing the longitudinal corridor from the front entrance we reach on the right a staircase, 4 feet 8 inches, with two landings leading to the upper story; next to that the water-closet, lavatory, bathroom, and small storeroom—the whole 21 feet long by 16 feet deep. The room next to that, 6 feet 6 inches by 16 feet, which was originally designated as clothes lockers and of no use in that capacity, was converted into a telephone room. The next room, 12 by 16 feet, is the commissary's office, and the corner room, 13 by 16 feet, the quartermaster's office. To the left of this hall the rooms are assigned as follows: The first room, 13 by 16 feet, for post-office with money-order office, established at my request by the Post-Office Department; the next room, 13 by 16 feet, as a printing office; the next as a room for the property officer and sleeping accommodations for two night clerks for the dispensary; the next to this the corner room, the dispensary, 17 feet 8 inches by 16 feet. These rooms all front on verandas, with double windows, and their doors all lead to the corridor with the exception of the dispensary, which has a door opening on the veranda.

The second story has been utilized as follows: In front of the hall a room assigned to a dentist; all the rooms to the right, seven in number, assigned to medical officers as quarters; the room over the commissary's office as photograph room, and the water-closet, lavatories, and bathrooms are over the corresponding rooms below. The rooms to the left of the hall front, five, are assigned as officers' wards. Those over the property officer's room are used as an eye, ear, and throat clinic; next to this an X-ray room, and adjoining this the pathological laboratory. Only six rooms in this building are provided with fireplaces.

To the left of the administration building, abutting on the lateral veranda, is the building for female nurses. It is a two-story structure with twelve sleeping rooms for nurses, 11 by 13 feet 6 inches each, opening on a central corridor of 8 feet. At one end is a dining room, 24 by 13 feet 6 inches, and opposite to it a scullery, 7 feet 6 inches by 13 feet, and kitchen, 10 feet by 13 feet 6 inches, and a lavatory, water-closet, and bathrooms. Opposite the bathroom is a staircase leading to the second story which has twelve rooms, 11 feet by 13 feet 6 inches each, and five rooms, 7 feet by 13 feet 6 inches each, abutting on the lavatory and bathrooms and staircase. There are no conveniences for heating this building, and coal-oil heaters have to be used until the steam plant is introduced.

At the opposite angle of the front of the hospital, abutting on the veranda, are the barracks for the hospital corps. It is a two-story building with a dormitory in each story, 36 feet 4 inches by 68 feet 6 inches. Abutting on this toward the veranda are rooms, 13 feet 8 inches by 9 feet 6 inches each, used for clerk's office, hospital steward's room, barber shop, and tailor shop, and farther toward the veranda a room with clothes lockers, 6 feet by 13 feet 8 inches, and staircase; on the opposite side water-closets, lavatories, and bathrooms with two bath tubs. The same arrangement is in both stories, except that the rooms are differently assigned.

The wards are isolated buildings, abutting as aforesaid on the veranda and variously raised from the ground as stated above. Their height is 15 feet by 24 feet by 127 feet, with 16 windows on each side. At the end nearest the veranda are, on the right side from the entrance, the linen room, 7 feet by 11 feet 9 inches, a diet kitchen, 8 feet by 11 feet 9 inches, and the wardmaster's room, 8 feet by 11 feet 9 inches. On the opposite side a bathroom, 6 feet; wash room, 6 feet, and a water-closet, 10 feet, all by 11 feet 9 inches, and separated by a hall 7 feet 6 inches. At the other end is a room 20 by 24 feet, which is used as a recreation room, and connects with the outside by a staircase. The floors of the wards are pine, with paraffin dressing. At present they are heated by three coal stoves, but when the steam plant is completed there will be a radiator underneath each window, connected with the fresh-air register, running under the floor of the ward, which receives its fresh air by suction from a shaft at the outer end of the ward. Underneath each bed is a foul-air register, which connects by a metallic duct with the foul-air duct running under the center of the ward and connecting with a brick shaft at the front end of the ward, in which, by means of steam coils, the air will be accelerated for aspiration. There are over each ward three metal ventilators reaching to the roof, with a register at the bottom, which is closed when artificial ventilation is used. For inlet the windows are provided with movable transoms 32 by 22 inches. The wards, allowing two beds between the windows, accommodate 40 patients. The wards have been named by the letters of the alphabet, commencing on the left.

The original plans of the hospital contemplated an operating pavilion, which, for the sake of economy and the improbability of much surgical work being done in this hospital, was cut off from the original plans and in place ward C was partitioned off

for the purpose. The result is that ward C contains 28 beds instead of 40. The exterior end of the ward on the left side entering has a room 9 feet 9 inches by 14 feet, which was designated as a pantry, but as this ward has already a pantry, this room was converted into a dressing room for minor surgical operations. It contains a sink and shelving. Next to this is a vestibule 7 feet by 8 feet 9 inches, which has an entry on the outside staircase which, in place of communicating with the end room, gives ingress through this vestibule. Next to this is a room 10 feet by 8 feet 9 inches, which was designated as a recovery room, but it will be utilized as a sterilizing room as soon as the sterilizer lately received is put in connection with the steam apparatus. To the right on entering this section of ward C is a room 14 feet by 18 feet 9 inches, which was designated as a nurses' room, but has up to the present time been used as a sterilizing room, and on this room being transferred will probably be utilized as a recovery room. Next to this, opposite the vestibule, is a wash room, into which I had placed foot-cock washtubs. This room is intended for a final preparation room for operations. These four rooms are separated by a hall 5 feet 6 inches wide, which connects by a double door with the ward. Next to the wash room is a room 10 feet 8 inches by 8 feet 9 inches, which is designated as an etherizing room. It has, however, been used as an instrument room and for the keeping of sterilized dressings, being occasionally used for etherizing when more than one patient was to be operated on. The end of the ward has been set aside as an operating room and is 20 by 24 feet, perhaps unnecessarily large. It has a skylight 5 feet square in the ceiling and is lighted by four windows. The floor is now being tiled. It is lighted by two 4-light chandeliers and two droplights.

At the lower end of the lateral veranda is the building called the quartermaster storehouse. This was finished at first only in the second story, while the basement, which was 12 feet above the ground on its lower end, was left unfinished. It having been found that no provision had been made in the hospital for a baggage room of the patients, every one of whom arrived with some kind of a box from the Philippines, it was deemed best to set aside the upper room for a baggage room and to complete the basement for the quartermaster and commissary storeroom. The building is 70 by 24 feet. On entering it, two rooms opposite each other, 7 feet 10 inches by 16 feet, have been planned as mattress room, in which capacity they were not needed, and one room was converted into a storeroom for camp and garrison equipments and the other for ordnance. The other room, 54 by 24 feet, was arranged with 400 pigeonholes in ten movable cases for the storage of the minor articles belonging to patients, so as to leave the wards entirely without any baggage. The basement was arranged at one end with shelves and drawers for clothing, and at the other end, separated by a 5-foot passage, for commissary supplies, the plan being to make the general hospital entirely independent of the post in its quartermaster and commissary supplies. A staircase leads from the veranda to the entrance of the basement.

The dining room abuts on the lower veranda and connects with the main veranda by two verandas which intersect it at the center. The building is 158 by 28 feet. Within 24 feet of its end it has an L, increasing its size by 18 feet. The dining room proper is 122 feet 7 inches long with five ridge metallic ventilators and nine windows on each side and three at the end. It accommodates ten tables with twenty seats each. At the lower end of the dining room it is partitioned off into a pantry 8 by 16 feet, with sinks and shelving. A sideboard for dishes is built on the dining-room side against this partition. A passage 8 feet wide permits ingress from the lower veranda with double doors. The room forming the L, 24 by 30 feet, was designated as an officers' mess, but as the officers, unlike those in civil hospitals, do not eat from the hospital mess, this room was used for other purposes, and has been arranged for a chapel and reading room. It contains also a library contributed by friends of the soldiers.

Opposite the dining room, on the other side of the veranda, there abuts on to it the kitchen building, which was originally intended only to be finished on the level with the veranda floor. It was intended to have the bakery on the same floor, but finding that this would too much crowd the space the basement has been completed into a bakery, one corner being partitioned off for the 2,000-gallon heater which supplies all the rooms in the hospital with hot water. The kitchen building is 71 feet long by 38 feet 10 inches wide. On entering the building through a hall 8 feet wide there is on the right-hand side a scullery, 14 by 20 feet, with a large wooden sink and china closets, connecting with the hall and the kitchen by double doors. On the left-hand side, with its entry into the kitchen, is the kitchen storeroom of the same size, part of which was intended to be divided off into a cold-storage room. The kitchen proper, as originally planned, was to have milk, coffee, water, tea urns, steam kettles for soup, meat, vegetables, and eggs, which were cut off when the

steam plant was originally disapproved. These will now be introduced. Meanwhile the cooking has been done on a French range extending the farther width of the room. Tables, dressers, shelves, sinks, and a dumb-waiter to the bakery complete the equipment of this room. It has two metallic vent cowls and is lighted by five windows on each side.

The next building to be considered corresponds in location to the baggage building at other end of the lower veranda. It was originally intended and designated "Detailed men's building." As there are no detailed men, and there was no provision made for a separate dining room and kitchen for the hospital corps, who are not living on the 40-cent ration, it was deemed best to put in additional rooms to complete this building. The floor on the level with the veranda has a dining room for the hospital corps, and the basement is divided into a kitchen for the hospital corps and storeroom for the general mess. This building is 72 feet 4 inches long by 25 feet 6 inches. It is entered through a 5-foot hall, on the right side being a lavatory, water-closet, and urinals, and on the left side a bathroom. These were left undisturbed. The dining room proper is 62 feet by 22 feet 6 inches, with two central metallic ventilators, and at the exterior end is divided off into two rooms, one for a pantry and one for dumb-waiter and service room equipped with necessary shelves.

Immediately in the rear of the main kitchen building is situated a building 85 by 23 feet, one end of which, 12 feet wide, was partitioned off as a mortuary, divided into two rooms of equal size.

The veranda on which all the buildings abut is 14 feet 4 inches and about 10 feet high, with roof sloping upward, which was originally covered with tar paper, but this having been found to be not durable has been replaced by tin. The basement of the veranda is closed by lattice panels of various heights. The outside of the veranda is inclosed with windows. The lower basement of the veranda has been found useful for storerooms, carpenter and paint shop, baggage room for the hospital corps, and has been divided off into a number of suitable apartments.

The steam plant.—As soon as I became acquainted with the climate of the Presidio I became convinced that some sort of artificial heat would be necessary to make the new hospital habitable, and I therefore urged reconsideration of the disapproval of the steam plant, which finally was approved. The use of this plant for ventilating purposes has been detailed above. In addition to this the smaller rooms will be provided with radiators on the direct method, and the dormitories of the hospital corps with direct indirect radiators and the necessary wooden aspirating flues. This steam plant by utilizing high pressure will permit the running of an ice plant, two dynamos, and the necessary laundry machinery, while the buildings will be heated by low pressure. The cost of washing done outside of the hospital has averaged $900 a month, and an equal sum was paid for electric lighting of the hospital, while the ice bill of the hospital averaged about $70 per month, and therefore this plant will effect a saving per year of $18,000 in the running of the hospital after deducting the expenses of its management:

Medical and surgical work performed during the year.—There were admitted during the year: State volunteers, 1,414; United States volunteers, 972; regulars, 2,198. Of the State volunteers, 9 died and 48 were discharged on certificates of disability; of the United States volunteers, 5 died and 104 were discharged for disability, and of the regulars, 52 died and 374 were discharged.

The following surgical operations were performed during the year, with two exceptions, all by myself:

Hernia	36	Circumcision	16
Appendicitis	13	Enucleation of glands	6
Extraction of bullets	8	Varicocele	10
Osteoplastic operations	12	Amputations	7
Empyema	2	Abscess of liver	1
Aneurism	1	Carcinoma	3
Contractures	1	Other operations	34
Abscess	3		
Enucleation of eye	7	Total	178
Hemorrhoids	18		

Of these operations 2 for hernia were performed by Col. W. H. Forwood, assistant surgeon-general, on my invitation, and 1 by Capt. H. A Shaw, assistant surgeon, United States Army.

Three cases were fatal, not, however, in consequence of the operation. One was appendicitis, which was brought after general peritonitis had set in. Another was trephining for fracture of the skull with general paralysis. (At the post-mortem the base of the skull was found fractured in addition to fractures of the dome.) The third was an exploratory laparotomy for supposed abscess of the liver; the patient did not die from the effects of the operation.

The clinical histories of these cases have been filed by hospital numbers and entered with their number on a nosological index to facilitate future investigation and research. The majority of the patients were brought by transports from the Philippine Islands, the remainder came from the volunteer camps, State volunteers on their return from the Philippines, and United States volunteers prior to their departure for foreign service.

The medical service was attended to practically by contract surgeons, who until lately were subject to frequent changes. As a rule, 1 medical officer attended to 2 wards of 40 patients each in the new hospital, and in addition these surgeons were charged with such work as attending officers' wards in the administration building, the eye and ear clinic, X-ray and photographic work, medical attendance on the hospital corps, supervision of patients' baggage room and library. The surplus of medical officers generally were assigned to duty in the various buildings occupied at the post when the capacity of the hospital proper was exceeded. The number of hospital stewards and hospital corps men employed at the hospital averaged from 130 to 150.

The number of female nurses employed at the hospital at its first occupancy was 34, which number was gradually increased to 50 and then reduced to 40 on my recommendation. The general assignment was 2 nurses for day and 1 for night duty, with such increase in detail as appeared necessitated by the number of bed cases. During the year 113 nurses have been at this hospital, of whom 69 were sent to the Pacific islands, and 10 ordered home for annulment of contract—services no longer being required—4 ordered home for annulment on account of ill health, and others transferred to various places. Thirty-six nurses have been on temporary duty awaiting orders. The conduct of the nurses has been exemplary and they have been faithful in the performance of their duties. While the number assigned appears excessive, and the nurses were not at all times occupied, it is believed that their mere presence in the wards was of great value in keeping up propriety of conduct on the part of the patients. The service for the sick was no doubt performed with greater exactness than would have been the case with members of the hospital corps, who, during the Spanish war and subsequently, were not selected with the care which could be given in peace times.

The part of this report pertaining to general organization was prepared at my request by Capt. H. A. Shaw, assistant surgeon, United States Army.

Organization of the hospital.—The administrative staff of the hospital consists of the following heads:

(1) Record officer.
(2) Property officer.
(3) Mess officer.
(4) Admitting physician.
(5) Officer of the day.
(6) Ward officer.
(7) Officer in charge of patients' property.
(8) Officer in charge of preparation of disability certificates.
(9) Officer in charge of detachment of hospital corps.
(10) Officer in charge of clinical records.
(11) Pathologist.
(12) Chief nurse.

This report is intended to give an outline of the work done in each department and the methods by which it is accomplished. The number of departments under the control of a single officer varies with the number of officers on duty. With the departments well organized and under competent stewards and clerks, the executive officer of the hospital should manage the departments of records, property, and mess, and command the hospital corps. The officer of the day is detailed by roster. One ward officer, in addition to the care of 80 to 100 patients, should take the department of patients' property; another ward officer the preparation of disability certificates and the clinical records. The pathologist for a general hospital should be selected with reference to that particular line of work. In a large general hospital his time will be fully occupied in making routine examinations of blood, urine, feces, post-mortem material, etc., so that he should never be called upon for ward work or other duty which would take him away from the laboratory.

Record officer.—This officer supervises the preparation of the official papers pertaining to patients. His chief clerk is a hospital steward, who directs the work of the record office, and is assisted by clerks whose duties are as follows: One clerk in charge of the post return; 1 in charge of the report of sick and wounded; 1 in charge of the preparation of final statements and the file of descriptive lists; 1 in charge of letters-received book; 1 in charge of letters sent; 1 in charge of the preparation of the consolidated morning report of patients; 2 clerks in charge of

the preparation of muster rolls, pay rolls, and clothing schedules (one of these clerks is in charge of the card index of patients' records); 1 clerk in charge of preparation of certificates of disability.

The most important single report made in the record office is the "Consolidated morning report of patients," for upon its accuracy in every detail depends the correctness of the post return, and if this report is unreliable no dependence can be placed on the official returns from the hospital. This report is made upon the following form:

Consolidated morning ward report.

U. S. ARMY GENERAL HOSPITAL,
Presidio of San Francisco, Cal., ..., *1900.*

Wards.	Strength.				Present and absent.		Alterations since last report.																				
		Absent.					Gains.		Losses.																		
									Discharged.			Transferred.															
	Patients present.	On furlough.	Without leave.		Aggregate present report.	Aggregate last report.	Original admission.	Transfers (ward).	Expiration of service.	For disability.	By order.	To duty.	A. & N. Gen. Hospital.	Gov. Insane Asylum.	Fort Bayard.	Wards.	Died.	Deserted.	Escaped.	Discharged soldiers left hospital.	Civilians left hospital.	Vacant beds.					
A																											
B																											

The data for this report come from two independent sources: First, from the ward; and second, from the officer of the day. Each ward reports to the record office at 9 a. m. daily the changes which have occurred in that ward for the twenty-four hours previous to 7.30 a. m. of that day, on a form with headings similar to those of the consolidated report, the changes being given also by name and organization.

Morning report of patients.

Ward ...., 1900.

Name of ward master or nurse preparing report: .....

Strength.				Present and absent.		Alterations since last report.																					
	Absent.					Gains.		Losses.																			
								Discharged.			Transferred.																
Patients present.	On furlough.	Absent without leave.		Aggregate present report.	Aggregate last report.	Original admissions.	Transfers (ward).	Expiration of service.	For disability.	By order.	To duty.	A. & N. Gen. Hospital.	Government Insane Asylum.	Fort Bayard.	Wards.	Died.	Deserted.	Escaped.	Discharged soldiers left hospital.	Civilians left hospital.	Vacant beds.						

Printed directions for making up the morning ward report are posted in the ward register, as follows:

"Carry forward from previous report the number reported in column 'aggregate present report' and place this number in column 'aggregate last report.' Enter all gains and all losses in proper columns. Add total gains to 'aggregate last report,' and subtract total losses, placing remainder in column 'aggregate present report.' Enter in proper columns the number absent on furlough and absent without leave and subtract the total absent from 'aggregate present report,' placing remainder in column 'patients present.' All the above entries are to be made by reference to the ward register, which should contain all the necessary information. All changes will be reported by name and organization. Enter first original admissions, then transfers (ward), and follow with other changes in the order named in report. Every change will be headed with the designation of the gain or loss, as—

Original admissions.

1. Smith, John, pvt., E, 13th Inf.; 25; W; Mass.; 3½; *Sheridan.*
2. Stevens, James, cpl., I, 9th Cav.; 31; C; Miss.; 10½; command.

Lost by transfer.

1. Rice, John J., to ward C.

Discharged for disability.

1. James, William C., pvt., B, 23d Inf.

Gained by transfer.

1. Wright, James J., pvt., A, 3d Art., from ward B.

On furlough.

1. Williams, George J., pvt., B, 6th Inf., till May 4, 1900.

"In the column for remarks note, in cases of 'original admission,' the age, race, birthplace, years service, and source of admission (in the order named); in cases received by transfer from other wards, the ward *from* which transferred; in cases returned to duty, whether in 'duty in United States' or 'full duty;' in cases transferred to other wards, the ward *to* which transferred; in case of death, cause and hour of death.

"When a patient is discharged from the service and remains in hospital, he should be dropped as an enlisted man and taken up on the same report as an original admission, and carried on the ward register as a discharged soldier.

"When a patient on furlough fails to return to the ward at the expiration of his furlough, he will be dropped from the column 'On furlough' and taken up in column 'Absent without leave,' with appropriate remarks as 'Smith, Thomas, private, B, 6th Infantry, from on furlough to absent without leave.'

"When a patient returns from furlough, he will be dropped from the column 'On furlough' and taken up in column 'Patients present' with appropriate remark below."

The officer of the day reports to the record office daily the names of all patients admitted for the twenty-four hours preceding 7.30 a. m. of that day, on the following form:

Admissions for twenty-four hours.

[U. S. Army General Hospital, Presidio of San Francisco, Cal.]

Ending 7.30 a. m. ....1900.

Name.	Rank.	Company.	Regiment.	Age.	Birthplace.	Years service.	Ward.	Hosp. No.
1.								
2.								

Departures are reported on a similar form.

These two reports (from the wards and from the officer of the day) are carefully compared by the clerk compiling the consolidated report, and if found to correspond the one with the other, the consolidated report is made accordingly—for instance, if the officer of the day's report shows John Smith admitted to ward A, the ward officer of that ward should report him as taken up as an "original admission," and similarly if the ward officer of ward B drops James Allen as "returned to duty," the officer of the day should report him in the list of departures. This double check on admissions and departures has been found absolutely necessary to prevent error. When the morning report is completed and signed by the executive officer and the commanding officer, it is passed to the clerk in charge of the report of sick and wounded, who enters on his register the names of patients admitted and the particulars as to those disposed of, checking each name in the column prepared for the purpose. (This clerk also enters on the officer of the day's report "Admissions for twenty-four hours" in the proper column the hospital number of each patient. This report is then returned to the officer of the day who enters the hospital number on the bed cards and index cards.) The consolidated report then goes to the clerk in charge of the card index who enters the data on the individual cards, making a check against each name and reporting any discrepancies as compared with the cards that he may observe. The morning report is next passed to the clerk in charge of descriptive lists, who obtains from it the names of men disposed of in order that he may make proper disposition of the descriptive lists.

In order to facilitate ready reference to a patient's record and also to diminish as far as possible liability to error in the keeping of the various records, the card-index system has been introduced. The complete record of each patient, so far as it pertains to medical status, pay, clothing, court-martials, correspondence, etc., is recorded on a card prepared for the purpose, properly indexed and filed.

When patients are to be discharged from the service or transferred to other hospitals, the ward officer is informed of the fact by notification from the record office on the following blank:

U. S. ARMY GENERAL HOSPITAL.
Presidio of San Francisco, Cal.,
....., 1900.

The following-named patients will be discharged from this hospital on..... and their names will be dropped on the morning ward report of..... They will be sent in charge of the ward master to report to the officer of the day at 10.30 a. m.....with a *disposition slip* signed by the ward officer.

Surname.	Christian name.	Rank.	Company.	Regiment.	Ward.	Authority for discharge.	Signature of ward officer or head nurse, ward master.

The property officer is charged with the care and accounting of public property. The following general order has been published in regard to this subject:

PUBLIC PROPERTY, ITS CARE AND ACCOUNTABILITY.

"In order to protect the public property at this hospital from loss and unnecessary damage, medical officers will be required to receipt to this office for all property in that part of the hospital over which they have control. These receipts will be made upon a prescribed form and will be rendered when the officer first assumes charge of the property. Careful distinction will be made between medical and quartermaster property, each being receipted for on a separate blank.

"Each ward will be supplied with a property book, in which will be entered all articles of public property, proper notation being made of all articles received and all expended or lost.

"Whenever public property is issued from this office, it will be accompanied by an invoice signed by the property officer and by a receipt for the signature of the receiving officer, who will, after personally verifying the property, return the receipt to this office.

"If a transfer of property is ordered from one building to another, the issuing officer will prepare invoices and receipts in duplicate; one invoice and both receipts will be sent to the receiving officer, the other invoice to the property officer. The

receiving officer will sign both receipts, sending one to the issuing officer and one to this office. Any discrepancy will be reported.

"All property received by issue from this office, by transfer, or found in ward, as well as all property issued by the officer, lost or destroyed, will be duly accounted for in the property book and also on the form 'Statement of property.' This form will be rendered to this office on the last day of each month, showing the dates of receiving and of disposing of all property during the month. In addition, a 'Statement of losses' will be rendered at the same time.

"Each ward officer will require his wardmaster to verify all public property in the ward on the 10th and 20th of each month. The ward officer will make a personal check of the property at the end of the month. All losses of or damage to public property will be promptly reported to this office. So far as possible, damaged property will be exchanged for that which is serviceable, in which case no invoice or receipts will be exchanged. When property is turned in to this office, the property officer will give his receipt to the responsible officer.

"Public property which has been placed in wards, offices, or other rooms of this hospital will not be removed except by direction of the commanding officer."

The blanks used in connection with the above order are these:

Monthly statement of medical property.

Ward. .... Month of ..... 1900.

Property received.			Property disposed of.		
Date.	Articles.	No.	Date.	Articles.	No.

I certify that this statement is correct.

.....

.....

Ward Officer.

Monthly statement of losses of medical property.

For the month of ..... 1900. Ward .....

Date.	Articles.	No.	Articles.

I certify that this statement is correct.

.....

.....

Ward Officer.

The admitting physician is the officer of the day. His duties are prescribed in the following general orders:

"The detail for officer of the day will be made by roster. His duties will begin at 9 o'clock a. m., and will continue during the succeeding twenty-four hours. He is the admitting physician of the hospital, and will examine all patients admitted and all discharged during his tour. Each patient admitted will be provided with an admission slip signed by the officer of the day. This slip will show the name, rank, company, regiment, age, birthplace, and years of service, as well as the ward to which he is assigned. It will be given to the head nurse of the ward, and the information will be copied in the ward register and also on the next morning ward report. The officer of the day will examine the ward papers of each patient sent to him for discharge, which should comprise (1) clinical history of patient, (2) disposition slip. He will see that these papers are duly signed by the ward officer, adding his name to the disposition slip as evidence that he has examined the patient and has found that the proper papers have been sent in by the ward officer.

"The officer of the day will not be held for the correctness of these papers.

"The officer of the day will keep a list of all admissions and departures, which he will sign before 7 a. m. and send to the record office.

"The officer of the day will inspect all the wards of the hospital at least once before 7.30 p. m., and all the wards of the new hospital between midnight and reveille, receiving a verbal report from the night nurse in each ward. He will inspect the guards at the door of the administration building and at the rear of the hospital at these times, receiving their reports, noting whether or not they are familiar with their duties.

"The officer of the day will make a written report to the commanding officer in regard to the condition of the wards, the general sanitary condition in and about them, together with the number of patients admitted and discharged during the day.

"The officer of the day will be present at reveille roll call of the hospital corps on the rear porch of the administration building, receiving the report of the steward in charge. Absentees will be reported to the commanding officer.

"The officer of the day at this hospital will in future confine himself to the limits of this reservation during his tour of duty. He will be found on duty in his office between the hours of 10 and 11.30 a. m. for the purpose of inspecting patients who are sent from the hospital. Ward officers will not send to the officer of the day patients for disposition except between the hours of 10 and 11 a. m. At other hours than those above mentioned the officer of the day will be found in his office, except when attending the necessary duties of the officer of the day and those in connection with his wards. The officer of the day will not exchange his tour with another officer except by authority of the commanding officer.

"Upon the arrival of patients in wards the officer of the day will send bed cards and index cards to the ward officer who will, without delay, fill them out in all possible particulars and return them to the officer of the day.

"The greatest care will be exercised that the spelling of names, the designation of organizations, and all other entries on the cards be correct in every particular."

The "Admission slip:"

Admission slip.

U. S. A. GENERAL HOSPITAL, PRESIDIO, S. F., CAL.

.....1900.

Surname.	Christian name.

Rank.	Company.	Regiment.	Age..	Race.

Birthplace.	Years service.	Source of admission.

The head nurse, ward ..... will admit this patient. The above data will be entered on the ward register and also on the index card, which will be immediately sent to the Officer of the Day.

.....

Officer of the Day.

The "Disposition slip:"

Disposition slip.

U. S. ARMY GENERAL HOSPITAL.
Presidio of San Francisco,.....1900.

Surname. Christian name.

Rank. Company. Regiment.

This patient has been discharged from ward.....this date by reason of:

(Enter below method of disposition.)

.....

.....

Diagnosis.....

.....

.....in line of duty—Yes or no.

.....,
Ward Officer, Ward.....

I certify that I have identified this patient and that I have received the required records from his ward.

.....
Officer of the Day.

This slip will be made out for every patient discharged from the hospital. The patient will be sent to the officer of the day, accompanied by the ward-master.

The "index card" referred to in the above orders is for file in the office of the officer of the day. This is the office to which visitors are sent with various inquiries, and the file of cards is a sort of bureau of information for visitors:

Surname.		Christian name.			Ward.
Rank.	Company.	Regiment.	Age.	Race.	Hosp'l No.
Birthplace.	Years service.	Date of admission.		Date of disposition.	
Source of admission.		Method of disposition.			

Name and address of nearest relative or friend.

.....

.....

These cards are filled out in the ward and not in the office of the officer of the day for the following reason: Patients are usually received at this hospital in large numbers and at comparatively infrequent intervals. If the work of carding them is divided up among twelve or fifteen wards, a complete file of admissions can be obtained in a very short time, and this is an important consideration in a hospital near a large city, where visitors come in crowds with each arriving transport, asking for information.

The "bed card" for each patient is filled out in the ward immediately after his arrival, and is sent at once to the officer of the day, who enters the hospital number and returns it to the ward.

U. S. ARMY GENERAL HOSPITAL.

PRESIDIO OF SAN FRANCISCO, CALIFORNIA.

Ward..... Bed No..... Hospital No.....

Name .....

Rank .....Co.....Regt .....

Admitted .....

Discharged .....

The duties of the guard are prescribed in the following general order:

"1. The guard on duty at the administration building will confine himself to the immediate vicinity of the front door. He will refuse admittance into the hospital of all unauthorized persons. Visitors will be taken to the officer of the day to receive a pass before being allowed to leave the administration building. The guard will not allow patients to leave the hospital without a pass. All enlisted men returning from pass will enter the hospital by the door of the administration building and will surrender their passes to the guard, who will note the hour of return and turn in the pass to the officer of the day.

"The guard on duty at the rear of the hospital will be found in the immediate vicinity of the boiler room when not on other duty connected with this detail. He will keep the boiler in good working order and the room clean. At night, between 6 p. m. and 6 a. m., he will make rounds at least once every two hours, trying all doors in the buildings in rear of Wards E and F, and will see that the windows and doors are closed and have not been tampered with. He will lock the gates of the hospital at retreat and unlock them at reveille, and will prevent patients and other persons from leaving the hospital in any unauthorized way.

"Guards will keep a sharp lookout for fire and will at once notify the officer of the day in case of its discovery."

The ward officer, in addition to his professional duties, makes the following reports:

1. A "Morning report of patients," on the printed form already referred to.
2. A weekly report on the following form:

U. S. Army General Hospital,
Presidio of San Francisco, Cal.,
....., *1900.*

Ward .....

The following-named enlisted men are, in my opinion, fit subjects for discharge or transfer, as noted below:

Surname.	Christian name.	Organization.	Remarks: State whether discharge on surgeon's certificate of disability, transfer to Fort Bayard, or transfer to Hot Springs is recommended.

....., *Ward Officer.*

NOTE.—This report will be made at 10 a. m. on Monday of each week to the executive officer. If the ward officer has no case for such disposition, he will so report on this form. Form 1–73.

3. A "Monthly statement of property" and "Statement of losses" on the prescribed forms.

He keeps the following records in his ward:

1. "Register of patients." This shows on the successive pages of a book from day to day the names of each patient in the ward, the organization to which he belongs, the date of admission, and upon his departure from the ward the method of disposition.

2. A "clinical history" of each patient. The following circular has been issued regarding the preparation of this history:

"Ward officers will exercise especial care that the form for the clinical record be complete before sending it to the office for file. When a patient leaves the hospital, there should be a clear and concise history of the case, giving dates as nearly correct as can be obtained, such for example as the date of arrival in the Philippine Islands, of any attack of illness after arrival with its duration, the date of onset of the present attack, that of departure for the United States, etc.

"After admission to this hospital, notes will be entered on a sheet headed, 'Progress of the case,' at sufficiently short intervals of time, from a day to a week, according to the case, to give at any point in the course of the disease a comprehensive exposition of the conditions present. Printed forms are provided for clinical histories, showing temperature, pulse, and respirations, and for pathological reports, such as examination of sputa, feces, urine, etc.

"When a man is transferred from one ward to another, the ward officer making the transfer will make the note in the 'Progress of the case,' 'Transferred from ward ..... to ward .....,' and append his signature.

"When a man ceases to be an inmate of the hospital, the ward officer will see that the date and manner of disposition and the condition of the patient at this time are entered on the form for clinical history and that the form is signed; only the signature of the officer last in charge should be found on this sheet, that of others who may have attended the case appearing under a note of transfer."

The diagnosis of each patient is reported to the record office, as soon as it is established, on the following form:

Diagnosis card.

Ward..... Hospital number.....

Surname. Christian name.

....

Rank. Company. Regiment.

.....

Diagnosis or complication. (Erase either not required.)

In line of duty—Yes or No.....

.....
Ward Officer.

Date.....1900.

NOTE.—The diagnosis, signed by the ward officer, will be reported on this slip to the record office as soon as established. This form is also used for any change in diagnosis or any complication, which should be reported at its occurrence.

3. An "order book," in which the ward officer enters all orders, prescriptions, etc., pertaining to patients.

4. Report of the night nurse.

5. "Ward property book." In this book is kept a record of all articles of medical and quartermaster property for which the ward officer is responsible, due account being made of all property received and all disposed of during each calendar month, when a return is made to the property officer on the form "Statement of property."

When a patient is transferred from one ward to another, the following blank is used:

Transfer slip.

U. S. A. GENERAL HOSPITAL,
Presidio, California, ..., 1900.

Surname.	Christian name.

Rank.	Company.	Regiment.

This patient will be *transferred* from ward ..... to ward .....

.....
Ward Officer, Ward .....

Received:

.....,
Head Nurse, Ward .....

This slip, signed by the ward officer, will be sent with the patient to the new ward, where it will be signed by the head nurse; after entering the data on the ward register, she will send the slip without delay to the officer of the day.

The officer in charge of the surgical ward keeps a record of each surgical operation in a book prepared for the purpose.

Each ward officer has the following assistants: One head nurse and two or three assistant female nurses; one wardmaster; one ward attendant (male) for day duty; at night, one female and one male nurse. This is the usual allowance for a ward of 40 beds.

The head nurse is responsible for the proper execution of all orders she receives regarding the care and treatment of the patients in her ward. She divides the patients into sections and appoints an assistant nurse for the care of these. She prepares the morning ward report of patients and has charge of the clinical histories of the cases.

The duties of the wardmaster are prescribed in the following general order:

"1. The wardmaster is charged with the care of the public property in the ward. In order to prevent loss, he will become familiar with the articles of property with which he is charged by reference to the ward-property book, and will on the 10th and 20th day of each month make a check of all property in the ward, reporting to the ward officer all articles missing and all in excess, as shown on the property book.

"Public property in the tea kitchen will be under the direct control of the head nurse of the ward, who will hold the key of the room and will report any loss of property to the wardmaster. She will be present on the days when the property is checked, assisting the wardmaster in locating it. The key of the tea kitchen will at night be held by the night nurse.

"The wardmaster will keep in his possession the key of the linen room, except when he is necessarily absent from the ward; he will then turn it over to the head nurse or night nurse, as the case may be. The room will be kept locked at all hours.

"The wardmaster will take charge of all clothing not in use belonging to patients in his ward. This he will take to the property room, receiving a receipt therefor from the officer in charge. Overcoats of convalescent patients will be kept in the linen room of the ward, each being tagged with the name and organization of the owner. Care will be taken that no overcoat is removed by anyone not the owner.

"The wardmaster will be held responsible for the police and sanitary condition in and about his ward. To this end he will, with the approval of the ward officer, detail patients for such light duty as they are able to perform.

"The wardmaster will present himself in the diet kitchen in time to take the diet orders to his ward. He will before taking away his carriage check its contents with his retained list of orders. He will, under the supervision of the head nurse and with the assistance of ward attendance, distribute the food.

"In case of the death of a patient in the ward, the wardmaster will immediately secure all his effects, including those in property room, making an inventory of them,

which will be verified and signed by the ward officer. The articles will then be stored in the linen room until final disposition is made.

"Ward linen which becomes soiled during the day will be collected in the laundry room under the ward. The wardmaster will make a list of all these articles on Form 10, taking them to the laundry building between 9 and 9.30 a. m., where they will be exchanged by the steward in charge for the same amount of fresh linen. All articles which have become worn and unfit for use will be sorted out and reported to the steward in charge as unfit for service."

An officer is detailed in charge of patients' property. Patients' private effects are kept in a storeroom with lockers prepared for the purpose. Each patient on depositing property receives a tag showing his name, organization, and a brief description of the property. The duplicate of this tag, with corresponding number, is filed in an index in the care of the storekeeper.

When a patient dies in hospital, the ward officer collects his effects and makes an inventory of them, which he sends to the executive officer on a prescribed form.

The personal effects of deceased soldiers are kept in the ward property room. When these are to be packed for shipment, the following blank is used for the protection of all concerned:

U. S. ARMY GENERAL HOSPITAL,
Presidio of San Francisco, Cal. ..... *1900.*

The ward officer of ward ..... will turn over all the effects of .....
.....
deceased, to the man in charge of the property room, who will check them from list furnished herewith and box them for shipment to .....
.....
at .....

.....
Capt. & Asst. Surgeon, U. S. A., Executive Officer.

U. S. ARMY GENERAL HOSPITAL,
Presidio of San Francisco, Cal. ..... *1900.*

I have this day boxed the effects of the above-named man and find them to agree with the list furnished me.

.....
Private, Hospital Corps, U. S. A.

The necessity of exercising the greatest care in the preparation of certificates of disability is so apparent that an experienced officer has been appointed to examine carefully each case recommended for discharge and then to supervise the completion of the papers of suitable cases. Ward officers make recommendations for discharge on surgeon's certificate of disability on a form already shown.

The officer in charge of the detachment of the Hospital Corps is responsible for the discipline of his command. His duties correspond largely to those of a company commander.

The officer in charge of clinical records inspects the record of each patient on the day following his discharge from the hospital, and when necessary returns it to the ward officer for immediate correction. The record is then filed with the others in numerical sequence of hospital numbers, regulars and volunteers being in separate files.

The pathologist keeps in books prepared for the purpose a record of every examination made in the laboratory, making a duplicate report to the ward officer in each case. He makes a weekly report to the commanding officer of the hospital regarding the work done in the laboratory.

The following regulations in regard to the work of the bacteriological laboratory have been published:

"*Examination of blood.*—The blood of every patient admitted to this hospital is to be submitted to the pathologist for examination. If nothing abnormal is found, the first examination will be considered sufficient unless a request is made for another by the pathologist or by the medical officer in charge of the case. Where the malarial plasmodium or any other abnormal condition is found, the blood is to be reexamined as often as the medical officer in charge of the case considers necessary.

"*Examination of urine.*—The urine of every patient admitted to the hospital is to be examined at least once; in cases which show no pathological condition of the urine, and which are not bed patients, the urine is not to be again examined unless requested by the pathologist or by the medical officer in charge. In pathological urine, and in the case of all bed patients, the urine is to be examined once a week unless in case of emergency a more frequent examination is considered necessary by the medical officer in charge of the case.

"*Examination of sputum.*—The sputum of every case showing pulmonary symptoms or in which a diagnosis of tuberculosis has been made, will be submitted for examination as often as the medical officer in charge of the case directs, or the pathologist requests.

"*Examination of feces.*—The feces of every case suffering from chronic diarrhea or dysentery will be submitted to the pathologist for examination at least once, and as often thereafter as he or the medical officer in charge may direct.

"*Use of examination blanks.*—A combined pathological blank which is attached to the clinical history is to be filled out for the first examination of each case; requests for reexamination should be made out upon a separate blank furnished for that purpose, which may be obtained at the laboratory.

"Wherever possible the clinical diagnosis will be verified by the pathologist, as in cases of pulmonary tuberculosis, malaria, amœbic dysentery, etc., and wherever such confirmation can not be obtained the fact will be stated on the diagnosis card.

"The pathological blank must be filled out and be accurate in every detail before being sent to the pathologist, special attention being paid to remarks concerning previous attacks of typhoid or malarial and as to clinical diagnosis and prominent symptoms. The report, when returned to the ward officer, should be filed with the clinical history.

"Specimens of urine, feces, sputum, etc., must be accompanied by the proper slip securely fastened to the bottle so that identical cases may be assured; these will be sent to the laboratory not later than 11 o'clock a. m., except in cases of emergency.

"All cases entering this hospital with a diagnosis of malarial fever, malarial cachexia, or in which malarial infection is suspected, should not have the blood examined until at least a week has elapsed after entry, unless active symptoms are present before that time. Quinine should not be administered to any such case until the blood has been examined and the diagnosis confirmed by the pathologist, except in pernicious cases, or where for some complication quinine is necessary.

"The chief nurse is charged with the duties usually devolving on the superintendent of nurses in civilian hospitals. She renders to the executive officer a daily report, 'Morning report of female nurses.'"

*Morning report of female nurses.**

U. S. ARMY GENERAL HOSPITAL,
Presidio of San Francisco, Cal., ...1900.

Present and absent.							Alterations since last report.						Duties of nurses.				
Present.			Absent.				Gain.			Loss.							
For duty.	Sick.	Total.	With leave.	Without leave.	Total.	Total present and absent.	Present and absent last report.	By contract.	By transfer.	Total.	By annulment of contract.	Transferred.	Total.	Chief nurse.	Asst C. nurse.	Ward duty.	Special duty.	Not assigned.

.....
Chief Nurse.

*All changes to be accounted for by name in this space, together with number, source, and date of order.

The mess department of the general hospital is under the supervision of a mess officer, who has under his immediate charge 1 hospital steward, 1 acting hospital steward, 4 civilian employees, and 27 privates of the Hospital Corps. It includes all kitchens and dining rooms for patients and for the Hospital Corps, the bakery, and supply storeroom.

Diets for patients are prepared in two kitchens according to an established bill of fare (General Orders, No. 28, July 13, 1900, being the latest diet table formulated for use at this hospital). In addition a daily order list of special diet with a supplementary list is provided for the use of ward surgeons for special cases. Copies of full and light diet table, special diet, diet order, and daily order lists are appended.

The following full and light diet table has been adopted as the standard of diet; it displaces a diet table of earlier date, a change in the table having been found advisable:

GENERAL ORDERS, No. 28.

UNITED STATES ARMY GENERAL HOSPITAL,
Presidio of San Francisco, Cal., July 13, 1900.

The following full and light diet tables are hereby ordered for this hospital and will be adhered to as far as practicable. Deviations must be reported by the cook to the officer in charge of the kitchens. General Orders, No. 21, December 28, 1899, is hereby revoked.

FULL DIET.

Breakfast.	Dinner.	Supper.
Sunday.		
Oatmeal and milk. Ham and eggs. Bread and butter. Fruit. Coffee.	Vermicelli soup. Roast veal, sage dressing, or Turkey or chicken and dressing. Stewed peas. Mashed potatoes. Farina pudding. Fruit. Bread and butter. Coffee.	Veal stew or boiled ham. Apple sauce. Cake. Bread and butter. Tea.
Monday.		
Germea and milk. Beefsteak. Fried potatoes. Bread and butter. Fruit. Coffee.	Roast beef. Mashed potatoes. String beans. Tapioca pudding. Bread and butter. Fruit. Coffee.	Codfish balls or hash. Bread and butter. Pickles. Jam. Sweet crackers. Prunes. Tea.
Tuesday.		
Oatmeal and milk. Sausage. Fried potatoes. Bread, butter, coffee. Fruit.	Vegetable soup. Baked pork and beans. Baked tomatoes. Bread pudding. Bread, butter, cocoa, fruit.	Fried liver and bacon. Corn bread and sirup or Biscuits. Bread, butter, tea. Fruit.
Wednesday.		
Milk toast. Beefsteak. Bread, butter, coffee. Fruit.	Roast mutton with dressing. Mashed potatoes. Corn or fresh vegetables. Chocolate pudding. Fruit. Bread, butter, coffee.	Mutton stew. Pickles. Sweet crackers. Bread, butter, tea. Peach cobbler.
Thursday.		
Germea and milk. Hash. Bread, butter, coffee. Fruit.	Oyster soup. Corned beef and cabbage. Boiled potatoes. Radishes. Rice pudding. Fruit. Bread, butter, coffee.	Sliced roast beef. Macaroni and cheese. Preserves. Bread and butter. Tea.
Friday.		
Oatmeal and milk. Bacon and eggs. Bread, butter, coffee. Fruit.	Baked fish with sauce. Plain boiled potatoes. Fresh salad. Farina pudding. Fruit. Bread, butter, cocoa.	Salmon salad. Potato salad. Apple sauce. Ginger crackers. Bread and butter. Tea.
Saturday.		
Germea and milk. Beefsteak. Fried potatoes. Bread, butter, coffee. Fruit.	Roast beef, veal, or pork. Mashed potatoes. Hot slaw. Cauliflower. Bread pudding. Bread, butter, coffee.	Baked hash or stew. Stewed prunes. Assorted cakes. Bread and butter. Tea.

LIGHT DIET.

Sunday.		
Oatmeal and milk. Soft boiled eggs. Milk toast. Coffee.	Rice soup. Farina pudding. Coffee.	Milk toast. Cup custard. Tea.
Monday.		
Germea and milk. Milk toast. Boiled eggs. Coffee.	Plain tomato soup. Bread pudding with lemon sauce. Coffee.	Farina mush and milk. Sweet crackers. Jelly. Toast. Tea.

LIGHT DIET—Continued.

Breakfast.	Dinner.	Supper.
Tuesday.		
Oatmeal and milk. Boiled eggs. Coffee.	Barley soup. Tapioca pudding. Cocoa.	Biscuits or corn bread. Maple sirup. Boiled rice. Milk toast and tea.
Wednesday.		
Oatmeal and milk. Soft boiled eggs. Coffee.	Consomme vermicelli. Cornstarch pudding. Vanilla sauce. Coffee.	Sweet crackers. Jam. Milk toast. Tea.
Thursday.		
Germea and milk. Boiled eggs. Coffee.	Oyster soup. Rice pudding. Coffee.	Macaroni and cheese. Milk toast. Maple sirup. Tea.
Friday.		
Oatmeal and milk. Boiled eggs. Milk toast. Coffee.	Fish chowder. Farina pudding. Cocoa.	Tapioca pudding. Milk toast. Ginger crackers. Boiled eggs. Tea.
Saturday.		
Oatmeal and milk. Boiled eggs. Coffee.	Vermicelli soup. Sago pudding. Coffee.	Germea mush. Assorted cakes. Jelly. Milk toast. Tea.

By order of Major Girard:

C. C. COLLINS,
First Lieutenant and Assistant Surgeon, U. S. A., Executive Officer.

In addition to the regular diet table a special diet list is provided for use of ward surgeons for cases requiring this class of diet; it also contains a list of broths intended for liquid diets.

Daily order list of special diet.

Ward .....

U. S. A. GENERAL HOSPITAL.
Presidio of San Francisco, ..., 1900.

	B.	D.	S.
No. of light diets			
No. of full diets			
Stewed chicken			
Chopped beef			
Steaks			
Mutton chops			
Baked potatoes			
French-fried potatoes			
Saratoga chips			
Creamed potatoes			
Baked apples			
Wine jelly			
Cup custard			
Milk toast			
Poached eggs			
Coffee			
Tea			
BROTHS.			
Beef broth			
Mutton broth			
Chicken broth			
Consomme broth			
Oyster broth			

.....
Ward Officer.

Accompanying the special diet list ward surgeons present a diet order, showing the number of diets in ward in classified order. This order also requires the number of loaves of bread needed for patients dieting in ward to be stated, in order to prevent any shortage as well as an excess of bread being sent to the wards.

Diet order.

Ward .... 1900.

Liquid diets .....

Special diets .....

Light diets { In ward. / In mess hall.

Full diets { In ward. / In mess hall.

	Breakfast.	Dinner.	Supper.
Number of loaves of bread required for diets in ward			

Form 55. ..... *Ward Officer.*

The articles required by wards on the daily order list include all such as need no preparation in the diet kitchen. They are issued direct, on the order of the ward surgeons, from the mess storeroom.

Daily order list.

Ward .....
No. of patients .....

U. S. A. GENERAL HOSPITAL,
Presidio of San Francisco, ..., *1900.*

Articles.	Quantity.	$	Cts.	Articles.	Quantity.	$	Cts.
Apples, fresh.....No..				Nutmegs .....oz..			
Apricots.....cans..				Oatmeal, H. O.....pks..			
Arrowroot .....tins..				Oranges .....No..			
Bananas .....No..				Oysters, fresh .....tins..			
Beer .....bots..				Oysters, cove.....cans..			
Beef extract.....tins..				Peaches.....cans..			
Biscuits, assorted .cartons..				Pears .....cans..			
Catsup.....bots..				Pepper .....tins..			
Chocolate.....lbs..				Pickles.....bots..			
Clam bouillon .....bots..				Pine apples .....cans..			
Cocoa .....lbs..				Salt.....lbs..			
Corn starch .....pkgs..				Sardines .....tins..			
Crackers, sweet .....lbs..				Sauce, cranberry ....tins..			
Crackers, soda.....box..				Sauce, Worcestershire..bots			
Crackers, snowflake..box..				Sugar, granulated ....lbs..			
Eggs.....doz..				Syrup.....tins..			
Farina .....lbs..				Syrup, maple .....tins..			
Ginger ale .....bots..				Tea, E. B.....ozs..			
Ginger snaps.....lbs..				Vanilla extract.....bots..			
Grapes .....baskets..				Vinegar .....qts..			
Honey .....jars..				Water, mineral, Shasta bots			
Horse-radish.....bots..				Waters, mineral, Apols..bots			
Jam .....glasses..				Electro silicon.....boxes..			
Jelly .....glasses..				Fly paper .....sheets..			
Jelly, currant .....tins..				Gold Dust.....pkgs..			
Lemons .....No..				Lye .....cans..			
Lemon extract .....bots..				Matches .....boxes..			
Milk, condensed .....tins..				Soap, Castile .....bars..			
Milk .....gals..				Soap, common .....bars..			
Milkine.....bots..				Soap, Ivory.....bars..			
Mushrooms.....cans..				Sapolio .....cakes..			
Mustard, French.....bots..				Melons .....No..			

..... *Ward Officer.*

Fresh fruits, apricots, peaches, plums, pears, berries, etc., will be furnished on this order, as required, during season. Orders for berries must be given 24 hours in advance.

This blank will be filled out each day with number and quantity of various articles wanted and will be sent to the steward in charge of the storeroom.

There are two kitchens for patients. The kitchen at the general hospital contains a large double French range for cooking, a large hot water tank is connected to it, giving the kitchen and scullery connected therewith a supply of hot water independent of source of general supply for the hospital. A diet pantry and storeroom is attached, and an elevator, recently added therein, conveys bread from the bakery below, as required for use in this kitchen and dining room. A number of improvements are now being made, by the installation of a complete set of steam kettles for meats and vegetables and a set of urns on a steam table for coffee, tea, hot milk, and water. In the vegetable and meat basement connected with this kitchen a cold storage room has recently been added which will enable the hospital to preserve its foods at a moderate cost. All diets that may be required for patients (full, light, and special) are prepared in this kitchen. They are sent to the wards in special rubber-tired carts designed for this purpose. The food being placed on trays and covered with vessels, a door being provided in each cart, further prevents loss of heat from food while being conveyed from kitchen to ward.

An acting hospital steward is in immediate charge of the kitchen and dining room connected therewith, and a force of 9 men, 7 privates of the Hospital Corps, and 2 civilians are employed. Their duties are as follows: The chief cook cuts all meats and generally supervises the preparation of all foods. He requires from the storeroom each morning before 9 o'clock the articles of food wanted for the next twenty-four hours. Second cook makes puddings, custards, broths, etc., and prepares all light diets. Third cook prepares all meats and potatoes and assists in general cooking at range. Fourth assistant prepares vegetables, does broiling of steaks, and attends to short orders. Fifth assistant prepares coffee, tea, or cocoa; also attends to policing and care of vegetable storeroom and carries fuel for ranges. Sixth and seventh assistants are pan and dish washers at sink. Eighth assistant, general police and at sink; attends to police of woodwork and window cleaning, also assists in the preparation of vegetables. Ninth man in charge of diet pantry; consolidates diet orders from wards to special blanks for the information of the chief cook in preparing diets; keeps accounts of articles of food used from diet pantry; reports to chief cook articles of food required in diet kitchen each day; supervises the placing of food in ward carts, being responsible that no error occurs, also care and police of kitchen storeroom.

The forms below are those used in kitchen. The daily order list is used as a requisition on mess storeroom for such supplies as are required during the day. On the diet calendar is copied all data from the diet orders and special diet lists from each ward, with the object of giving the chief cook the orders for the day in consolidated form for ready reference.

Daily order list, diet kitchen.

Total No. of diets .....

U. S. ARMY GENERAL HOSPITAL,
Presidio of San Francisco, ..., *1900.*

Amounts.	Articles.	$	Cts.

Diet calendar for kitchen.

U. S. ARMY GENERAL HOSPITAL.
Presidio of San Francisco, Cal., ..., *1900.*

Wards.	Liquid.	Light.	Full.	Special.	Mess.	No. of patients.
A						
B						

In the patients' dining room and scullery connected therewith, five privates of the hospital corps and as many convalescent patients as may be required, are employed. On account of distance of kitchen from dining room and the size of the dining room

itself, it is desirable to have two men wait at each table; this to avoid any delay in supplying the wants of patients. The food is brought from the diet kitchen to the dining room in carriers, and is then distributed. The dining room contains 10 tables, with a capacity of 20 patients to each table; the number of tables could be readily increased to 14 should the requirements of the hospital necessitate this increase. Hours for meals are as follows: Breakfast, 7.30 a. m.; dinner, 12.30 p. m.; supper, 5.30 p. m. The doors of the dining room are opened at the sounding of mess call. Each patient as he passes in presents a meal ticket to an attendant stationed at the door for this purpose. These tickets are counted and the wards checked after each meal. The number of tickets received from each ward is entered on the attached form, which is then compared with the number of patients reported for mess hall on the diet orders of the respective wards. A check is thus maintained and the surreptitious feeding of expatients and others, a standing evil which is always to be contended against, is prevented.

U. S. A. GENERAL HOSPITAL.

PRESIDIO OF SAN FRANCISCO, CAL.

Date.....1900.

BREAKFAST
DINNER
SUPPER

Indicate proper meal by crossing off the other two.

A		F	
B		G	
C		H	
D		I	
E		J	

I certify that this statement is correct as showing number of patients from each ward fed in dining room for this meal.

.....

Lance Actg. Steward U. S. A., in charge of Dining Room.

This slip to be turned in to the mess office after each meal.

The kitchen for the patients treated at the brick and wooden barracks, used as adjuncts to the hospital proper, is a company kitchen converted to use of the hospital. Food for 75 to 200 patients is prepared here. Its use as a diet kitchen is not thoroughly satisfactory; the cook range being too small for the requirements, as well as the kitchen itself. Only articles of full diet are prepared here. In it one civilian as cook and three privates of the hospital corps are employed. The cook is assisted at the range by a private of the hospital corps; two additional privates of the hospital corps attend to the general policing of the kitchen and basement connected therewith, the preparation of all vegetables and washing of dishes in use in the kitchen. They are assisted by such convalescents as may be required from time to time. One private of the hospital corps is in charge of the dining room; to assist him in his duties a number of convalescent patients are daily detailed. A convalescent meal ticket is used at this dining room with the same check system as at the new hospital.

The bakery employs one civilian as chief baker, with a salary of $50 per month, and one private of the hospital corps. All bread consumed by patients, hospital corps and female nurses, is made at the hospital bakery. Since its opening, August 10, 1899, 120,720 loaves of bread, at an average cost of 1.36 cents per loaf, have been baked and issued. Bread is issued from 7.30 a. m. to 8.30 a. m., and from 3.30 p. m. to 4.30 p. m. Issues are made by the baker on an order signed by the man in charge of dining room or kitchen. They are turned in to the mess storeroom each evening by the chief baker, who renders a report at this time on the amount of flour used

and number of loaves of bread baked and issued during the day. Supplies are furnished to the bakery from the subsistence funds for patients, from the hospital corps and female nurses, in amounts proportionate to the cost of bread consumed by each organization. No savings are made from flour in bakery, and there are no bakery expenses except those for actual manufacture of bread, the civilian baker employed being paid by the Medical Department.

To supply the diet kitchen a general subsistence storeroom is kept and is under the immediate charge of the mess steward. All subsistence supplies for kitchens and wards are received and issued here. One lance acting steward and two privates of the hospital corps are employed in connection with this storeroom. A market wagon makes daily trips to the city for butter, eggs, and fruit. Supplies are purchased from the commissary of the general hospital and from various firms in San Francisco as required.

Bids are requested from firms for the various articles needed at short intervals. The supplies are received and checked from the bills delivered by merchants and at the close of each day are entered upon a daily report of expenditures, said report showing the total amount expended for the day.

Daily report of expenditures for mess.

U. S. ARMY GENERAL HOSPITAL, PRESIDIO OF SAN FRANCISCO, CAL.

Ending ..... 19..

Articles.	Quantity.	Price.	Total.	Remarks.
Beef				
Veal				
Mutton				
Pork				
Milk				
Ice				
Chicken				
Bread				
Commissary of subsistence				
Sum total				

.....

Form 54. *Hospital Steward, U. S. Army.*

A morning report is prepared showing number of patients in hospital during day, and the allowance for same; a balance is then struck between the daily allowance and expenditures.

Morning report, mess U. S. Army General Hospital.

PRESIDIO OF SAN FRANCISCO, CAL., ...19..

Patients on diet.			Financial statement.		$	cts.
	Remaining last report.			Remaining from last report.		
	Gained.			Allowance for current day.		
	Lost.			Total credit.		
	Total remaining.			Expended.		
Amount allowed at 40 cts. per man per day.				Balance remaining.		

Remarks:

.....

Form 53. *Hospital Steward, U. S. Army.*

The supplies received for the day are then entered on an abstract of receipts, which is completed at the termination of each month. This abstract contains printed headings of all articles likely to be used in the hospital and ruled for daily entries.

Abstract of purchases of food for the sick in the U. S. Army General Hospital, Presidio, S. F., Cal., for the month of .....

Date of purchase.	Apples.	Apples evaporated.	Allspice.		Bacon.	Baking powder.	Barley, pearl.	Bay leaves.	Beans, lima.	Beans, navy.	Beef.	Biscuits, assorted, ten.	Brains, calf.
On hand to be acc't for	*Box.*	*Lbs.*	*Lbs.*		*Lbs.*	*Cans.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Tins.*	*No.*

Certain articles of diet not requiring preparation (milk, crackers, jellies, etc.), are issued to wards direct from this storeroom. Milk is required for by wards, direct to the storeroom on daily order lists. As these lists are received in the storeroom the amount of milk asked for thereon is entered in a designated column on a form "daily milk account," the total amount plus a small extra quantity for emergencies being taken.

Daily milk account.

U. S. ARMY GENERAL HOSPITAL.

Presidio of San Francisco, Cal., ..., 1900.

Wanted.		Delivered No. of gals.			To whom delivered.
Ward.	No. of gals.	a. m.	p. m.	Total.	Signature of person receiving milk.
A					
B					

Issues are made on daily order lists signed by ward officers who designate the articles required for their patients. The number of patients in the ward is entered on the list. After issue the price of each article is entered and the total cost of issues with the number of patients for whom required entered on a card bearing name of ward and which has daily entries of cost per ward and number of patients therein for each month. The cost of articles issued to kitchens is also charged daily against each kitchen.

Articles after issue are entered on an abstract of issue roll which is completed and compared with the abstract of receipts on the last day of each month. An inventory of supplies on hand is then taken and the account closed for the month.

Abstract of issues and expenditures of food for the sick in the U. S. Army General Hospital, Presidio, S. F., Cal., for the month of.....

Date of issue.	Apples.	Apples, evaporated.	Allspice.		Bacon.	Baking powder.	Barley, pearl.	Bay leaves.	Beans, lima.	Beans, navy.	Beef.	Biscuits, assorted ten.	Brains, calf.	Butter.
On hand to be acc't for..	*Box.*	*Lbs.*	*Lbs.*		*Lbs.*	*Cans.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Tins.*	*No.*	*Lbs.*

Experience has shown that under a system of fixed-diet table, special-diet table, and extra-order lists for ward use it is necessary to maintain a storeroom, keeping therein at least three days' supply of such nonperishable articles as may be required. Without such a storeroom a sudden contraction or expansion in the number of patients causes a financial stringency. The amount allowed, 40 cents per patient, is not sufficient for a sudden increase of patients requiring special diets, unless the regular-diet table is reduced at each influx; likewise it is not sufficient if the number of patients drop to 200 or below with a large number of special diets remaining as is usual. To obviate a continual change of diet tables, thereby enabling the maintaining of one standard of diet, a storeroom with supplies for 500 patients for three days, must be maintained.

A storeroom renders an exact account of stores received possible. The receipt of stores direct into kitchens for immediate use is prone to cause confusion and errors and is detrimental to any attempt to systematize the accounts of a mess intelligibly.

The Hospital Corps is fed from a separate kitchen and a separate dining room. Four privates of the Hospital Corps are employed in the kitchen, one as cook, one as assistant cook, two as general police and in the preparation of vegetables. The dining room for the Hospital Corps is above the kitchen, the food being sent to dining room from kitchen by means of a small lift. In the dining room three privates of the Hospital Corps are on duty. About 125 Hospital Corps men are fed here on an average.

U. S. ARMY GENERAL HOSPITAL,
Presidio of San Francisco, Cal.

The following bill of fare is hereby ordered for the Hospital Corps and will be adhered to as far as practicable. Deviations must be reported by the cook to the officer in charge of the kitchens.

BILL OF FARE.

Breakfast.	Dinner.	Supper.
Sunday.		
Fried ham and eggs. French fried potatoes. Bread, butter, coffee.	Roast veal and gravy, with dressing. Mashed potatoes, corn. Cornstarch pudding. Apple sauce. Bread, butter, coffee.	Cold meat, potato salad. Bread, coffee. Apple pie.
Monday.		
Oatmeal and milk. Fried bacon. Fried potatoes. Bread, butter, coffee.	Vegetable soup. Roast beef and gravy. Boiled potatoes. Stewed tomatoes. Bread, coffee.	Beef stew. Stewed prunes. Bread, butter, coffee.
Tuesday.		
Biscuits. Meat and gravy. Butter, coffee.	Vermicelli soup. Roast mutton. Mashed potatoes. Turnips, coffee, bread.	Cold meat. Fried potatoes. Rice pudding. Bread, coffee.
Wednesday.		
Beefsteak. Hot cakes, syrup. Coffee.	Bean soup. Roast beef and gravy. Boiled potatoes, peas. Coffee and bread.	Cold meat. Fried potatoes. Apple pie. Bread, coffee.
Thursday.		
Oatmeal and milk. Meat and gravy. Fried potatoes. Bread, butter, coffee.	Vegetable soup. Baked beans, bacon. Bread, coffee.	Hash, baked. Sago pudding, prunes. Bread, butter, coffee.
Friday.		
Biscuits. Beefsteak and gravy. Potatoes. Butter and coffee.	Vegetable soup. Baked fish. Mashed potatoes. Lima beans. Bread and coffee.	Cold meat. Potato salad. Stewed apples. Bread, coffee.
Saturday.		
Oatmeal and milk. Cold meat and gravy. Bread, butter, coffee.	Vermicelli soup. Roast beef. Macaroni and cheese. Bread and coffee.	Meat and gravy. Fried potatoes. Rice pudding. Bread, coffee.

The hospital fund has no source of revenue at this hospital, except from savings of rations and such small sums as may be gained from the feeding of sick officers who are messed from the kitchen of the Hospital Corps. In this the Hospital Corps detachment on duty at this hospital is under a decided disadvantage as compared with company organizations and post hospitals who enjoy the advantages of such benefits as accrue to hospital and company funds by a well-directed post exchange.

REPORT ON THE WORK DONE IN THE BACTERIOLOGICAL LABORATORY OF THE UNITED STATES ARMY GENERAL HOSPITAL, SAN FRANCISCO, CAL., BY ACTING ASST. SURG. CHARLES F. CRAIG, PATHOLOGIST TO THE HOSPITAL.

I have the honor to submit a report of the work done in the bacteriological laboratory of this hospital for the period July 1, 1899, to June 30, 1900.

Prior to October 4, 1899, when I took charge of the routine pathological work of the hospital, the following examinations had been made by Acting Assistant Surgeon Ames:

Total number to October 4, 1899, 614, divided as follows:

1. Examinations of blood, 256. Of these examinations 91 gave a positive reaction to the Widal test and 15 proved positive for the malarial parasites. Of the 15 positive malarial cases 11 showed the tertian parasite, 3 the æstivo-autumnal parasite, and 1 the quartan parasite.

2. Examinations of urine, 132.

3. Examinations of sputa, 87. Of these, 16 showed the presence of the tubercle bacillus.

4. Examinations of cultures for Klebs-Loeffler bacillus, 65. Of these, 32 proved positive.

5. Examinations of fæces, 30. Of these, 6 showed the presence of the amœba coli.

6. Miscellaneous examinations, 44.

Of the 91 positive Widal tests a large number were reexaminations.

From October 4, 1899, when I was assigned to duty here, to June 30, 1900, the total number of examinations made has been 5,574. These examinations may be divided as follows:

A. Examinations of blood	2,464
B. Examinations of urine	2,071
C. Examinations of sputa	496
D. Examinations of fæces	313
E. Examinations of cultures	46
F. Examinations of post-mortem material	159
G. Miscellaneous examinations	25
Total	5,574

(A) Examinations of blood. These may be divided as follows:

1. For the parasites of malaria and leucocytosis, 1,891.
2. For the Widal test, 561.
3. For the estimation of the number of blood cells, 12.

1. Of the 1,891 examinations of the blood for the parasites of malarial fever, 264 proved positive and 1,627 negative. This large negative result is due to the fact that the blood of every case admitted to the hospital is examined whether malarial fever is suspected or not. Hardly any of the negative cases were diagnosed as malarial fever, although many had been diagnosed as "malarial cachexia;" but repeated examinations of the blood of most of these cases resulted negatively, and the cases were found to be suffering from chronic dysentery or diarrhea.

Of the 264 positive cases 134 were found to be infected with the tertian malarial parasite (18 being double tertian infections), 100 with the æstivo autumnal parasites, 27 with both tertian and æstivo autumnal parasites, and 3 with quartan parasites.

The tertian infections were mostly contracted in this country and the Philippine Islands, and proved very amenable to treatment. The æstivo autumnal infections were much more resistant to treatment, but I have yet to see one which has not yielded to quinine when properly given, although, of course, exacerbations of the disease often occurred if the quinine was discontinued. In fact, it is very difficult to determine when any case of malarial fever is actually cured, as is evidenced by the recurrence of the disease in so many cases after weeks or even months in uninfected localities. In one case in which tertian parasites were found in the blood, it had been months since the last attack of malaria, and quinine had been taken steadily up to a week before the attack, when it was stopped. After only a week's

absence of quinine the disease recurred, thus proving how resistant malarial infections can be to treatment, and that no active symptoms may show for months under quinine, but its withdrawal may be promptly followed by such symptoms.

I have been able to confirm in the æstivo-autumnal cases the occurrence of two varieties of the parasites causing the disease, and will submit a detailed report as soon as possible concerning this subject.

Three cases of quartan-malarial fever have been observed, one of which was of more than usual interest, showing numerous nearly full-grown quartan-malarial parasites in the blood, characterized by the coarse, immotile pigment, clear outline, and the shrunken condition of the infected corpuscles and their olive-green color. This man had been in the hospital since November 19, 1899, and had never had any distinct malarial symptoms or any paroxysm. Despite this, his blood contained full-grown quartan parasites in goodly numbers. The case is of interest, as showing how the blood may contain numerous parasites, although there are no clinical symptoms produced by them. It also shows how important an examination of the blood is, and how little clinical signs can be relied upon in diagnosing certain cases of malarial fever. In time, when the organisms became sufficiently numerous, this case would undoubtedly have developed symptoms, but the microscopical examination of the blood made it possible to apply the proper treatment before the clinical appearance of the disease, and thus saved the patient much discomfort.

Another case is also of interest, both because of the type of the disease and the great resistance of the infection to quinine. The patient entered the hospital November 3, 1899, with the history of a chill every four days. The blood contained numerous hyaline and half-grown quartan parasites. Quinine was given in large doses. His symptoms disappeared, as did the parasite from the blood. After about three weeks the quinine was discontinued and the elixir of iron, quinine, and strychnine substituted. In a few days he developed symptoms, and on December 11, 1899, his blood was examined and numerous half-grown quartan parasites found. Quinine was at once given in 15-grain doses once a day. The patient improved, and it was thought safe to discontinue the quinine on January 4, 1900. Next day the patient had a chill and numerous quartan parasites were found in his blood.

It will be seen from the foregoing that after reducing quinine and finally substituting the elixir of iron, quinine, and strychnine the patient had slight symptoms and the parasites were found in the blood. The symptoms disappeared, and also the parasites when large doses of quinine were again administered, and as long as the patient continued taking 15 grains of quinine a day he remained well. However, on stopping the quinine for only two days, after having taken it nearly a month, he had a severe paroxysm and numerous parasites were found in the blood. I believe that this is the first case of quartan-malarial fever on record which has proven so resistant to quinine, for, as a rule, quartan-malarial fever is very amenable to treatment. The case is of general interest as showing how long the malarial parasite may remain dormant, apparently disappearing, only to reappear when quinine is discontinued, and how important it is to continue the administration of the drug for weeks after all symptoms have ceased. Since January 6 he has had another exacerbation, due to the withdrawal of quinine.

The occurrence of these three cases of quartan fever has given me an excellent opportunity of studying this interesting and rare variety of the malarial parasite. Of over 1,500 cases of malaria, the blood of which I examined and the records of which I have preserved, only 10 cases of quartan fever were observed. The quartan parasite, on account of its rarity, has not been as often and as accurately studied as either the tertian or æstivo-autumnal parasite. Its cycle of development, as is well known, occupies seventy-two hours. The first form of the organism seen in the blood is a small hyaline disk, very minute and actively amœboid. Although these bodies are generally believed to be indistinguishable from similar tertian parasites, I believe that the quartan-hyaline body is more sharply cut and refractive than the tertian, while the invaded corpuscle is of a more greenish hue. In a few hours these small hyaline organisms have grown larger, are less actively amœboid, and a few granules of dark-brown pigment may be seen within them, generally at the border of the organism. The shape of the organism is either round or triangular, the amœboid motion being very sluggish. The pigment is motionless. I have never seen a pigmented organism which was actively amœboid. The organism is sharply outlined and refractive, while the invaded corpuscles are greenish in color and not swollen. Even at this early stage I believe it is possible to distinguish this form from the tertian parasite, which is dim of outline, of irregular bizarre shape, with active pigment, and inhabiting a pale, swollen corpuscle.

In twenty-four hours the distinguishing features of the quartan parasites are fully developed. The organism is sharply cut and looks often as though it were stamped

into the blood corpuscle; is refractive, and its protoplasm often presents a peculiar, finely granular appearance; the pigment is dark brown in color, in the form of rather coarse granules, and is generally collected around the edge of the organism, sometimes forming almost a complete wreath around it; the pigment is absolutely motionless. The shape of the organism at this stage of development is usually triangular, ovoid, or round, and is not amœboid. The invaded corpuscle is smaller than the healthy ones, and is of a darker green color. All these characteristics clearly distinguish the quartan form from the tertian parasite, which is less sharply cut and refractile, is more or less amœboid, very irregular in outline, possessing lighter brown, more finely granular pigment, which is always motile, while the infected corpuscle is pale and often greatly swollen.

At the end of thirty-six hours all the phenomena noted are more pronounced, the organism filling about two-thirds of the corpuscle, which seems to be retracting about it. The pigment is increased in amount, but is motionless and collected in rough masses at the border of the organism, which is not amœboid. The growth of the organism from this time on is very slow, and it is not until a few hours before segmentation that the full-grown bodies are observed. Such an organism is circular in shape, bordered by a thin greenish layer representing the remains of the infected corpuscle, with numerous clumps of dark-brown motionless pigment, not only entirely confined to the periphery of the organism, but scattered through it, the protoplasm of the organism being finely granular in appearance. In many instances segmentation was seen to take place even before the corpuscle was entirely destroyed, the pigment collecting toward the center of the organism and six or more segments appearing within the corpuscle. Most commonly, however, the pigment in the full-grown parasites collects at the center in a solid, almost black, mass, and about the same time all trace of the infected corpuscle disappears, the organism being apparently extracellular. In a short time radial striations are observed shooting out from the central pigment, and these joining at their extremities form from six to fourteen oval segments. As a rule, the number of segments does not exceed ten. They are arranged regularly at first around the central pigment, forming the so-called "marguerite forms," but soon they begin to separate and disappear, the pigment at the same time disintegrating and becoming diffused. The number and the beautifully regular arrangement of the segments would alone serve to distinguish this stage of the quartan from the corresponding tertian parasite, but the quartan segments are also more oval in shape, more refractile, and somewhat larger. The star-like arrangement of the pigment between the segments, which Thayer considers as so characteristic, is generally observed, but I have seen exactly the same arrangement of pigment in tertian segment forms. It is probably simply an accidental occurrence, doubtless more common in the quartan parasite, but not at all peculiar to it.

The pigment in the quartan organism is only motile in the very young forms, is always dark brown in color, and occurs in round granules or in irregular masses of such granules. It generally occupies the periphery of the organism and tends to become collected at one portion, but in the full-grown parasites the granules and blocks of pigment are scattered throughout the protoplasm.

The outline of the quartan parasite, especially after the first twenty-four hours, is always very sharply cut, and appears as though stamped into the corpuscle. The shape of the organism is either round, oval, or triangular, and only in the very early hours of its development does it send out amœboid processes of any size. Later the amœboid movement consists of a gentle, sluggish undulation of the periphery of the organism, but even this ceases after the first thirty-six hours.

The protoplasm is refractive and often, on close inspection with a good light and a high power, a peculiar, finely granular appearance is noted, which has been mentioned. This, together with the sharply cut outline and blocks of pigment, brings to mind very forcibly the similar appearance of the ovoid bodies and crescents of the æstivo-autumnal parasites. Indeed, the organism during every stage of its development resembles much more closely the tertian æstivo-autumnal parasite as it occurs in splenic blood than it does the ordinary tertian organism. The corpuscles which are invaded by the quartan parasites are invariably somewhat shrunken and greener in color than the healthy corpuscles, but are not often crenated.

From this résumé of the characteristic features of the quartan parasite, as it has been observed here, it will be seen that it can be easily distinguished from the ordinary tertian type by its cycle of development covering about seventy-two hours; by its smaller size; sharply cut, more regular outline; refractive, finely granular protoplasm; motionless darker brown pigment, collected peripherally; lack of or very sluggish amœboid motion; smaller number of segments, which are more refractive, oval in outline, and more easily distinguished.

During the past four months I have had the opportunity of completing certain

observations upon the flagellated forms of the malarial parasites, which, by the courtesy of the Surgeon-General, have been published in the New York Medical Journal for December 23, 1899. A brief review of the conclusions arrived at follows:

From the observations made I believe that there occur in the blood of cases of tertian, and especially in the blood of the æstivo-autumnal fever, two forms, or perhaps varieties, of the flagellated malarial organism.

The following method is most useful in obtaining flagellated bodies: The finger or ear is carefully cleansed with alcohol, as also the slides and cover glasses. Either the finger or lobe of the ear is compressed. A puncture is made with a sterile needle, and the first drop of blood wiped away. The second drop remains exposed until the slide is gently breathed upon, when the tip of the drop is pressed upon the side of the slide which has been thus moistened. The cover glass is then immediately placed over it and the preparation is ready for examination. The slight exposure of air and the small amount of moisture upon the slide seems to hasten exflagellation, since specimens so prepared almost invariably contain flagellated bodies. The two forms of flagellated parasites above referred to are designated as the active and passive flagellated plasmodium. The active form is the most common form found in the blood of tertian malarial fever. It is also found in æstivo-autumnal fever, but in this condition varies somewhat in morphology in unessential particulars. The chief facts to be noted in reference to the active form are the extreme activity of the pigment in the parasite prior to flagellation and during the time the flagella remain attached to it, the clubbed extremity of the flagella and the separation and constant individual existence of the flagella, and their power of individual and progressive movement in the blood. While the passive flagellated plasmodium is more common in æstivo-autumnal fever than in the tertian malaria, not every case shows flagellated organisms. They will only be found in the peripheral blood in those cases of fever showing crescents, for it is from the crescent that they develop. The points to be especially noted in the passive flagellated parasite are that the pigment does not become active and distributed throughout the plasmodium, the circular arrangement of the pigment, the absence of clubbed outer extremity to the flagella and the frequent presence at the juncture with the round body of a nodule which resembles exactly the clubbed outer extremity of the flagella of the active body. Instead of the rapid serpentine lashings of the flagella in the active form the movements in this form apparently consist in a rapid revolving upon their axes, the flagella sometimes pulling themselves loose from the round body and again becoming attached to it. In specimens in which the nodular swelling is not noted the pigment has a more rapid vibratory motion. These forms of malarial parasites represent the efforts of flagella which have been set free in the circulation to penetrate into the interior of the parasite represented by the round bodies just described.

In the light of the researches of McCallum, Thayer, and others, I believe that the passive flagellated bodies represent a phase of fertilization of the parasite probably having to do with its extra corporeal life.

The following observations upon the staining reactions of the parasites of malarial fever are of interest and are the result of experience gained in the examination of a very large number of stained specimens of malarial blood:

The staining reactions of the tertian, quartan, and æstivo-autumnal parasites.—There are many ways of staining the parasites of malarial fever, but a description of a few of the most useful is all that will be attempted at this time. The blood smears are prepared by carefully cleaning the lobe of the ear, puncturing it with a sterile needle or lancet, touching a clean cover glass to the resulting drop of blood, and placing another cover glass over it. The two are then slid very gently and carefully apart, and the smear allowed to dry. Care should be used not to get too much blood upon the first cover glass, and to use no pressure in sliding the glasses apart. After drying the smears are allowed to harden in equal parts of alcohol and ether for half an hour, when they are ready to stain. The plasmodia are stained by nearly all basic aniline dyes, but not by the acid dyes. For staining, I use either Romanowsky's or Chenzinsky's method, the latter preferably. Romanowsky's method is as follows: Two solutions are used—solution No. 1, a saturated aqueous solution of methylene blue; solution No. 2, a 1 per cent watery solution of eosin. The methylene-blue solution should be at least one week old. The staining solution is made fresh each time it is used, and consists of one part of the filtered methylene-blue solution added to two parts of the eosin solution and thoroughly mixed. The smears are placed face down upon this solution and allowed to stain from one-half to three hours or more. The best results are obtained after about two and a half hours' staining. By this method the red corpuscles are stained red by the eosin and the parasites a deep blue by the methylene blue. Romanowsky believed that the nuclear chromatin stained a violet

color, but I have never been able to confirm his observations. Although very beautifully stained specimens can be secured by this method, I much prefer the method of Chenzinsky, for the reason that it gives a more natural appearance. By Romanowsky's method, and, in fact, by most methods, the coloring is very vivid, especially that of the red corpuscles by eosin, whereas in Chenzinsky's method the red corpuscles are stained more dimly, appearing almost natural in color, while the parasites are stained a fine blue, fully as well as by any other method.

Chenzinsky's method is as follows: A concentrated watery methylene-blue solution, diluted one-half with water, is added to an equal amount of a one-half per cent solution of eosin in 60 per cent alcohol. This solution is bottled and kept and improved in staining qualities by age. The specimens are stained with this solution for five minutes and then washed in water, dried, and mounted in Canada balsam. Much better specimens are obtained by staining for two hours or more, and I have secured very fine specimens by leaving the smears in the staining solution overnight.

There are numerous other methods of staining the malarial parasites, but these are the most satisfactory and useful.

A word as to the use of stained preparations for diagnostic purposes. I am aware that a few authorities use stained preparations almost entirely for diagnosis, but I believe that it is a cumbersome and very unreliable practice. Where it is impossible to keep a specimen of blood fresh enough to look at under the microscope the use of stained preparations is of course necessary; but where it is possible to examine the blood fresh it is always to be preferred, as it is infinitely more exact and satisfactory. I have seen many cases where the fresh blood showed numerous ring forms of the æstivo-autumnal parasites in which smears taken at the same time and stained most carefully showed either none or at most a very few dimly colored parasites. There is also the danger of mistaking stained granular matter or débris lying upon the corpuscles for the small æstivo-autumnal parasites in the smears, and this mistake can be very easily made by one who is unaccustomed to examining such preparations. The only strictly scientific way of diagnosing the various forms of the malarial parasites is by the microscopical examinations of the fresh blood, and after all most specimens of blood will keep in a suitable condition for examination under ordinary circumstances for six, eight, or even a greater number of hours, despite the text-book statements to the contrary.

The staining method devised by Futcher is to be recommended wherever speed is desirable in staining or where the fresh blood can not be examined and a speedy diagnosis is essential. It is as follows: The smears are hardened in a 1 per cent solution of formalin in 90 per cent alcohol for from a half to one minute. They are then dried and stained for from twenty to thirty seconds in the following solution of thionin, known as Marchande: Saturated solution of thionin in 50 per cent alcohol, 20; 2 per cent solution of carbolic acid, 100. The solution should stand several days before using. After staining the specimen is washed in water, dried, and mounted in Canada balsam. The red corpuscles are stained a very slight greenish hue, while the parasites are deep violet in color. Care should be used not to stain for too long a time, and also not to allow the formalin solution to act long, as it seems to cause a degeneration and vacuolization of the red cells. The method stains the æstivo-autumnal rings very satisfactorily.

The staining reactions of the tertian and quartan malarial parasites.—In properly stained preparations of the tertian and quartan parasites two distinct portions can be made out—a deeply staining ectoplasm and a dimly staining endoplasm. The endoplasm is really the nucleus of the parasite, and sometimes there can be seen, situated eccentrically between the ecto and endo plasm, a very deeply stained spot, the nucleolus, and this contains the greater part of the chromatin substance. These appearances are best observed in half-grown parasites which are not undergoing marked amœboid change of form. The ectoplasm contains the pigment. The nucleus is generally round or oval in shape and eccentric in situation. The very youngest tertian and quartan parasite is represented by a blue ring, the center of which is almost colorless. At some portion of the central colorless area and the blue-stained ring may often be seen a deeply stained dark-blue dot. Here we have the clearly differentiated ectoplasm stained blue, the endoplasm, or nucleus, almost unstained, and the deeply stained nucleolus. As the organisms grow, pigment granules appear in the ectoplasm, or stained portion, and by reason of the change of shape to the amœboid motion the central colorless nucleus is not easily made out, it being often situated in one of the pseudopodia. By reason of the amœboid changes in the shape of the parasites and the situation of the pseudopodia at different levels in the infected corpuscle it often appears as though there were two or more stained parasites within one corpuscle. In the stained ectoplasm both deeply and dimly stained areas can be dis

tinguished. These occur without any regularity, and are probably due to different quantities of the stained protoplasmic substance collected at certain places. It will often be noticed that the extremities of the pseudopodia are stained much more deeply than other portions of the parasite. Very seldom is any pigment seen within the clear, almost unstained nucleus. Often, however, young forms are seen which stain almost uniformly throughout, no trace of a nucleus being visible.

As the parasites grow larger and approach full development, the distinction between the ectoplasm and the nucleus is gradually lost and is often represented simply by a more or less irregular, dimly stained area free from pigment. Often even this appearance is absent, and the parasite consists of a pretty uniformly stained pigmented mass of protoplasm. The small, deeply stained spot or nucleus always disappears before the parasite attains its full growth, and is by no means constant even in the young forms.

Just before segmentation, when the pigment has collected in a clump, the stained tertian or quartan parasite presents a peculiar dotted or mottled appearance, due to small, very deeply stained dots or spots scattered through the more deeply stained protoplasm of the parasite. As segmentation advances and the parasite begins to split up it will be seen that these darkly staining dots are in reality the nucleoli of small dimly stained rings or young tertian or quartan parasites, and correspond exactly to the young stained forms first described.

The pigment does not stain appreciably in well-prepared specimens, and the parasites which show the centrally situated clear, very dimly staining area or nucleus are always collected within the stained ectoplasm. This agrees well with the well-observed fact that in the fresh specimen the pigment granules are almost always collected at or near the periphery of the organism in its young pigmented stage.

The staining reactions of the æstivo-autumnal malarial parasites.—The staining reactions are similar, both for the quotidian and tertian æstivo-autumnal parasites.

The "ring forms" of the æstivo-autumnal parasites show a more or less deeply stained outer portion, a round or oval unstained central position, and a very deeply staining minute dot, situated at some point at the periphery of the stained ring. As the parasites grow, the endoplasm stains faintly and the distinction between it and the ectoplasm becomes less marked. The deeply staining dot disappears and just before segmentation the parasite stains a uniform blue throughout. The pigment granules, if present, are collected in the stained outer portion, in the half-grown parasites, and at or near the center just before segmentation. The individual segments stain, as do the intracorpuscular rings, the only difference being that they are smaller.

Staining reactions of the crescents and ovoids.—The crescent form of the æstivo-autumnal parasites presents many interesting staining phenomena. In those crescents in which the pigment is collected near the center the organism as a whole takes a rather dim blue color, the poles staining much more deeply, while the center, in which the pigment lies, is often unstained or but dimly stained. At each pole, as a rule, may be seen a very deeply stained semilunar portion extending to its periphery and covering the horns of the crescents. The appearance presented is that which would result had each horn of the crescent been dipped into a darker staining fluid and withdrawn. Between the dimly stained horns of the crescent and lying within the more dimly stained protoplasm are often seen very deeply stained round or oval spots irregularly distributed. In some crescents these deeply stained spots are very distinct and occupy a large part of the protoplasm of the crescent. As a rule the area in which the pigment lies and immediately surrounding it stains very faintly or not at all, but it is not rare to see a darkly staining belt or band passing through the center of the crescent, seeming to divide it into two parts. This appearance, however, is not common and does not by any means prove the dual nature of the crescent. Surrounding the crescent in the majority of instances is a narrow eosin-stained border, believed to be the remains of the red corpuscle in which the crescent was developed. This red-stained border does not always, however, entirely surround the crescent; sometimes it is only observed between the two horns, forming the so-called "bib;" sometimes it is absent there and present over the convex portion of the crescent; sometimes it can only be seen covering the horns of the crescent. It is often observed to be broken or ragged in outline and interrupted in places, thus suggesting the gradual disintegration of the red cell. Crescents are often observed which do not show any eosin-stained border, and in such cases we may assume that the destruction of the red cell is complete and the crescent is free in the blood plasm.

While the above description applies to the majority of stained crescents, many exceptions occur. Quite often crescents are observed stained uniformly throughout. Others do not present the deeply stained spots or polar staining; others stain very dimly at one pole and deeply at the other. In fact, it would be almost impossible

to describe all the variations which may occur, but in the vast majority of examinations of stained crescents the description given will be found correct. There is no evidence in crescents of a nucleus.

The ovoid bodies stain exactly as do the crescents, so far as I have been able to observe, save that the polar staining is not so pronounced.

In studying the blood of soldiers returning from the Philippines and suffering from malarial fever I have noticed in several cases a peculiar form of the malarial parasite and which I have classified in reporting upon the cases as a tertian parasite, but which presents so many differences from the ordinary tertian parasite as to indicate that it is a distinct variety of the plasmodia.

I have invariably observed it in the blood of cases having tertian paroxysms, and always in large numbers. All stages of the parasite have been observed, from the hyaline disk to the segmenting bodies. It appears first as a very highly refractive circular hyaline disk, having a sharply cut outline and having absolutely no amœboid motion. The absence of amœboid motion differentiates it from all other young forms of the malarial parasites, and is, therefore, very distinctive. The hyaline disk is about one-fourth the size of the infected corpuscle, which is normal in size and appearance. I have never observed any "ring forms" of this hyaline stage.

In a few hours the hyaline disk has grown to about one-half the size of the corpuscle which contains it and has become pigmented. The pigment exactly resembles that found in the ordinary tertian parasite, being finely granular and motile and distributed unequally throughout the parasite. The parasite is perfectly circular in shape and devoid of all amœboid motion. The border of the parasite is very sharply defined and the protoplasm very refractive and sometimes finely granular. The infected corpuscle is unaltered in size or color and is not crenated or shrunken.

In about 38 to 40 hours the parasite has nearly filled the corpuscle containing it, and the amount of pigment has increased. The parasite is perfectly circular in shape and presents the same refractive protoplasm and sharply cut border; the pigment is sluggishly motile, reddish in color, and the shape of fine granules. The infected corpuscle is normal in size and color.

I have not as yet observed the presegmenting forms in the blood, but have seen several free segmenting forms. These are much smaller than the ordinary tertian segmenting forms, and the greatest number of segments observed has been ten. The segments are oval in shape or perfectly round, sharply cut and refractive. The pigment is usually collected in a solid reddish brown mass at the centre and is immotile.

From the description given it will be seen that this parasite differs markedly from the other known malarial organisms.

The following table will make this more plain:

FROM THE TERTIAN PARASITE.

Hyaline stage:

1. Always circular in shape, while tertian is irregular and bizarre.
2. Absence of amœboid motion, while tertian is markedly amœboid.
3. Clear-cut and refractive, while tertian is indistinct and not refractive.
4. No change in infected corpuscle, while the tertian-infected corpuscle is often larger and more pale.

Pigmented stage:

1. Always circular in shape, while tertian is irregular.
2. Absence of amœboid motion, while tertian is amœboid in early stage.
3. Clear-cut outline and refractive, granular protoplasm, while tertian outline is less distinct and protoplasm is cloudy.
4. More sluggish motion of pigment.
5. No change in size, shape, or color of infected corpuscle, while in tertian the infected corpuscle is larger than normal and much more pale in color.

Segmenting stage:

1. Smaller number of segments and their more clearly cut outline.

FROM THE ÆSTIVO AUTUMNAL PARASITE.

Hyaline stage:

1. Perfectly circular shape, while the æstivo autumnal parasites are often irregular.
2. Absence of "ring forms."
3. Absence of all amœboid motion.
4. Large size.
5. No change in infected corpuscle.

Pigmented stage:

1. Large size.
2. Greater amount of pigment and greater motillity of it.
3. No "ring forms."
4. Absence of all amœboid motion.
5. No change in infected corpuscles.

Segmenting stage:

1. Greater size of segments.
2. Larger amount of pigment.

FROM THE QUARTAN PARASITE.

The differentiation of this parasite from the quartan organism is much more difficult than is the case with the tertian or æstivo autumnal parasites. Indeed, I first mistook them for quartan parasites until the clinical histories of the cases and certain peculiarities of the parasites caused me to study them more carefully. This organism is about the size of the quartan parasite, has the same clear-cut outline and refractive, finely granular protoplasm, and divides into about the same number of segments, but the following differences are to be noted:

Hyaline stage:

1. Perfectly circular shape; quartan irregular.
2. Absence of amœboid motion; quartan amœboid.

Pigmented stage:

1. Perfectly circular shape; quartan often triangular or ovoid.
2. Absence of amœboid motion; quartan amœboid at beginning of pigmentation.
3. Larger amount of and more finely granular pigment, irregularly distributed and motile; quartan has coarse pigment granules, arranged in a wreath-like manner around the edge of parasite, collected at one portion, and the pigment is absolutely motionless.
4. No change in infected corpuscles; corpuscles infected with the quartan parasite are usually smaller than normal and of a darker brown color.

Cycle development, 48 hours; quartan, 72 hours.

From the foregoing it will be seen that the two great points in which this parasite differs from all other malarial parasites is the retention of its perfectly circular shape through all stages of development and the absolute absence of all amœboid motion. These two phenomena have been present in all the cases in which I have observed the organism, about six in number. I believe that this parasite is either a distinct variety of the malarial plasmodia or that it is a tertian parasite which has acquired the characteristics described through some unknown condition of environment acting upon the development of the organism.

In closing this portion of my report I wish to call attention to the large number of cases of æstivo autumnal fever presenting no symptoms, but in which the blood examinations showed parasites. Fully 40 per cent of the cases showed no active symptoms.

The Widal test.—Five hundred and sixty-one Widal tests were made, of which 96 proved positive and 465 negative. Of the 96 positive reactions, 51 were reexaminations made of cases tested between July 1 and October 4, 1899. In all the cases giving a reaction the clinical symptoms showed them to be typhoid, save in one instance, where the diagnosis was doubtful clinically. In no case in which typhoid fever was diagnosed clinically did the Widal test fail to react.

In point of time the reactions may be divided as follows:

Day of disease.	No. of cases.	Day of disease.	No. of cases.
Fifth day	4	Second week	2
Sixth day	10	Fourth week	35
Seventh day	2	Sixth week	20
Eighth day	2	Six months, convalescent	5
Ninth day	1	One year, convalescent	4
Tenth day	4	Two years, convalescent	2
Eleventh day	2	Seven years, convalescent	1

In the last case the patient gave a clear history of having had typhoid fever seven years ago, and had not been sick until his present illness from chronic dysentery. The case is of interest as showing how long the reaction may persist. It is probable in such cases as this that many of the confusing and varying results of the Widal test

have arisen, causing an ill-deserved condemnation of it from men too careless to inquire into the past history of the patient, whose blood has given the contradictory results. The more I use the test the more I become convinced that, if properly used, with perfect technique and proper attention to every detail, it is practically the best and surest diagnostic sign of the disease which we possess at present. In more than one instance in cases when the clinical symptoms of typhoid were entirely absent, and yet a positive Widal was obtained, autopsy showed the presence of typical ulcerations in the intestine, thus proving the correctness of the reaction.

The large negative result is due to the fact that the Widal test has been used largely here as a routine measure, most of the cases being tested regardless of the disease present. There has been no complete tabulated list of these cases kept, but below are listed 360, giving the diagnosis and results of the test. It may be said that on only one of these cases was the result positive, that of a case of miliary tuberculosis. While the patient gave no history of having had typhoid fever, it is possible that he may have had a slight attack while at Chickamauga Park in 1898.

Diagnosis.	No.	Result of test.	
		Positive.	Negative.
Tertian malarial fever	45	.....	45
Quartan malarial fever	2	.....	2
Æstivo-autumnal malarial fever	32	.....	32
Comb. æstivo autumnal and tertian	9	.....	9
Chronic dysentery	94	.....	94
Chronic diarrhea	10	.....	10
Chronic tuberculosis	50	.....	50
Acute miliary tuberculosis	5	1	4
Acute rheumatism	4	.....	4
Chronic rheumatism	30	.....	30
Insolation	5	.....	5
Progressive pernicious anæmia	11	.....	11
Diphtheria	5	.....	5
Smallpox	2	.....	2
Appendicitis	4	.....	4
Wounds of operative cases	20	.....	20
Acute pleurisy	4	.....	4
Tonsillitis	8	.....	8
Abscess of liver	2	.....	2
Acute bronchitis	5	.....	5
Lobar pneumonia	1	.....	1
Acute gastritis	1	.....	1
Chronic gastritis	1	.....	1
Neurasthenia	1	.....	1
Acute coryza	1	.....	1
Insanity	8	.....	8
Total	360	1	359

Examination of urine.—There have been 2,071 specimens of urine examined, both chemically and microscopically. Of these 282 contained albumen, 102 granular and hyaline casts, 97 pus, 13 blood, and 3 sugar.

In examining the urine of chronic dysentery cases I was impressed by the great increase in indican which they presented, and undertook some observations as to the significance of this increase in indican in this particular disease.

Before giving the results of the indican tests a few words regarding the relation of indican to disease, and the objects aimed at in the tests, may be of interest.

When albumen is undergoing bacterial putrefaction indol is produced, and this is the basis of indican. Within the system it is oxidized to indoxyl-sulphuric acid. This acid, decomposed, yields indigo blue or indican. In health but little indol is produced, as putrefaction is absent, and accordingly indican can not be detected in the urine, or, if present, it is in very minute quantity.

Indican occurs in the urine in a number of disease processes and is not pathognomonic of any one disease. It occurs with albuminoid putrefaction. In tuberculosis, in certain nervous disorders, in malignant diseases of the internal organs, and in wasting diseases indican often occurs in excess in the urine. Fetid pus may be the source of indican, as in abscess of liver and empyema. In these tests, then, it is not intended to show that indican in the urine is of any diagnostic importance as regards chronic diarrhea or dysentery, but to learn, if possible, how often it occurs, what its import is, and whether its amount helps in any way in prognosis, and as to the success or otherwise of any plan of treatment.

The test employed for detecting is as follows: Thirty cubic centimeters of urine is mixed with an equal quantity of hydrochloric acid, 1 to 3 drops of dilute nitric acid

added, and then boiled, when the mixture turns a dark color. It is then cooled and about 5 cubic centimeters of chloroform added and shaken. The chloroform sinks to the bottom of the test tube and, if indican is present, is colored blue, violet, or almost black. If the indican is present in slight quantity, the chloroform is of a beautiful blue color; if there is a large increase, the chloroform is a deep reddish-violet color, while if the increase is immense, the indican falls as a fine dark-blue or black powder and when it has settled to the bottom of the tube forms a dense, almost black precipitate.

Now, as to the results of the indican tests in cases diagnosed as chronic dysentery to date:

There have been 63 cases investigated, in 46 of which the indican was increased, while in 17 it was normal.

In the 46 cases in which the indican was found increased 22 showed a slight increase, 12 a large increase, and 12 an immense increase.

The relation of the number of bowel movements a day to the amount of indican present is as follows:

Movements per day.	Number of cases.	Slight increase.	Large increase.
1	10	3	7
2	11	4	[1]7
3	7	4 [1]2	1
4	6	4 [1]1	1
5	7	2 [1]2	3
6	2	2	
7	1	1	
8	1	1	
9	1	1	
10	0		

[1] Immense increase.

The relation of the negative cases to bowel movements is as follows:

	Cases.
1 movement a day	1
2 movements a day	1
3 movements a day	3
4 movements a day	3
5 movements a day	3
6 movements a day	3
10 movements a day	2
11 movements a day	1

Twelve of the above cases have 4 or more bowel movements a day.

At the first test 7 cases had a large increase in indican, with but 3 bowel movements a day.

One week later the same 7 cases showed no indican, but were having from 5 to 15 bowel movements a day. As regards prognosis, the results obtained would at first appear contradictory, if a small amount of indican is considered as a favorable import, but this only apparent. Von Jaksch says: "In general, therefore, the appearance in the urine of large quantities of indican implies that abundant albuminous putrefaction is progressing actively in some part of the system. In simple constipation a notable indicanuria will very often arise." In dysentery and diarrhea no one can doubt but that there is much intestinal putrefaction. Why, then, in many cases having few bowel movements and thus generally considered to be favorably progressing, is indican found, while in many cases having numerous bowel movements the indican is absent or normal? The reason is obvious. In the latter cases, the intestine, by frequent movements, is kept empty, and putrefaction is accordingly less intense; the indol found is rapidly excreted and indican is not formed. Where the bowel movements are few and the disease is present putrefaction is intense, much indol is formed, has time to combine with the sulphuric acid present, and indican is excreted.

This is certainly a strong argument for the eliminative treatment of dysentery by salines, as sodium sulphate, so highly recommended by the French, as no one will deny that indican in dysentery means intestinal putrefaction, and intestinal putrefaction in the long run in these cases means death.

The indican test so far shows this, as regards prognosis: A case of dysentery having few bowel movements a day and showing no indican in the urine is progressing very favorably. A case of dysentery having many bowel movements a day and showing much indican in the urine is in a dangerous condition.

Cases having few bowel movements and much indican need eliminative treatment.

In cases of dysentery having many bowel movements and no indican the prognosis is doubtful, unless the bowel movements are due to eliminative measures.

Further research in this subject will undoubtedly result in at least confirming these results.

Examinations of sputa.—There have been 496 specimens of sputa stained and examined for the bacillus of tuberculosis, of which 70 showed the presence of the bacillus, while 426 were negative. Most of the negative results were obtained in patients suffering from chronic diarrhea or dysentery. Many cases of this disease simulate tuberculosis very closely in their lung symptoms and physical signs, there being often a cough, much expectoration, night sweats, etc., while percussion is also misleading, as the abnormally thin chest wall and the oftentimes shrunken or emphysematous lung tissue give a resonance strongly resembling the percussion note in cavity formation in the tuberculosis lung.

There have been many cases of chronic dysentery in which the attending surgeons have suspected and even diagnosed pulmonary tuberculosis, but in which no bacilli were found after repeated examinations of the sputa. Autopsy in several of these cases demonstrated the value of sputum examinations over physical signs, for in none of these cases was there any trace of pulmonary tuberculosis, although hypostatic pneumonia, pleurisy, and emphysema were commonly found and evidently caused some of the physical signs.

The sputa of all patients having a cough was examined for the tubercle bacillus, whether or no lung signs were present, which also helped in obtaining the large negative result. In the examinations for the tubercle bacillus here, as well as elsewhere, I have noticed especially the great variation in morphology which this bacillus presents in different specimens of sputa. These variations are interesting from both a botanical and diagnostic point of view. From the description of the germ in the majority of text-books upon bacteriology we are prepared to see almost invariably a slender rod, about two-thirds the diameter of a red-blood corpuscle in length, straight or slightly curved, and sometimes presenting a beaded appearance. As a matter of fact, though the form just described is altogether the most common, we do find in a very large number of cases many deviations from the classical type, some of them being peculiar and interesting. The beaded bacilli are present in small numbers in almost every specimen of sputa examined, but quite often specimens are found which contain almost nothing but the beaded form of the organism. As the unstained portions of the bacillus are held by some authorities to be spores, it is of interest to inquire into the meaning of this form. It has been the author's experience that the beaded form of the bacillus is found most often and numerously in the sputa of acute, rapidly advancing cases of tuberculosis. As spore formation in a germ is not evidence of rapid multiplication, but only occurs where multiplication by fission is hindered by unfavorable conditions, the spore being a resistant form of the organism calculated to withstand such conditions, we would expect to find spore-bearing bacilli more numerous in chronic or slowly advancing cases of the disease rather than in acute cases, where the conditions must be more favorable for the growth of the organism. It would seem, then, that the form of the bacillus in question can hardly be called a sporulating body if the theory just quoted is correct, but in the present state of our knowledge and reasoning from the well-known appearance of other spore-bearing bacilli when stained it is hard to explain them in any other way. The beaded bacilli are often numerous, sometimes there not being a solid bacillus to be seen in certain microscopic fields, and they resemble very much short strings of minute streptococci. In general, if the bacilli are curved at all it is but slightly, but in rare instances the curvature may be very extreme. In several instances a bacillus was observed almost doubled upon itself, forming a U-shaped organism. This form is, however, very rare, it being much more common to find the organism less acutely bent. These curved forms are almost always stained uniformly throughout, but occasionally they are irregularly stained. They should be carefully examined, as quite often a similar appearance is produced by the joining of two bacilli, but this is more V-shaped.

A form of much interest, because of the liability of its being taken for another organism, is that to which may be given the name of "streptococcic form." Ordinarily the beaded form of the bacillus, if examined carefully, will be seen to be continuous in outline, the clear spaces being bounded laterally by a dimly stained membrane. In this form, however, no such continuation of the bacillus can be

found, the deeply stained portions being circular in form and separated one from the other. These deeply stained portions may be two in number when the organism resembles a diplococcus, or they may be strung out in long or short chains, when it is almost impossible to distinguish them from streptococci. It is just here that the method of decolorizing becomes important, for many times I have been in great doubt respecting this form of the organism until, after repeated and careful use of the acid solution, it became evident that it was the tubercle bacillus, and not the streptococcus, which was present. As streptococci are very numerous in tubercular sputa in many instances, and as this form of the tubercle bacillus so much resembles them, too much care can not be taken in staining and decolorizing. In some instances a portion of the bacillus stains solidly and the remainder is broken up into deeply stained dots.

It sometimes happens, in examining sputa for this organism, that forms are detected which are very thick and deeply stained. This appearance may be caused by the coalescence of two or more bacilli laterally, or it may be a form of a single organism. Certainly it has been impossible to detect any separation longitudinally, and I do not remember to have ever seen an appearance which would suggest that this form is composed of more than one organism.

The looped form of the bacillus occurs rarely. The organism is longer than usual, and twisted upon itself so as to form a loop, but more commonly the loop is situated at one end, the rest of the bacillus being straight or slightly curved.

The long "filamentous form" is of rare occurrence, but it is of great interest. It is not an uncommon form in old cultures and has been often described, but in sputum it is much less common. The filaments are almost invariably stained uniformly throughout, the only thing peculiar about them being their curved outline and their great length. Their resemblance to the tubercle bacillus as ordinarily described is, as can be seen, very slight, but as they are very rare and always accompanied by large numbers of the classical bacilli the diagnosis of tuberculosis will not be endangered.

The remarkable feature about the "knobbed form" is that at some portions of the bacillus, generally on its lateral surface, there is a well-developed knob or lump. This lump may, however, be situated in the center of the organism.

Having within the past three months come across two cases the sputa of which showed numerous examples of the branching form of the bacillus, a description of this rare form may be of interest. I have observed it once before in tubercular sputa and quite often in old attenuated cultures of the germ. Nocard and Roux were the first to call attention to branching and budding forms in avian tuberculosis. Klein, Dixon, and Mafucci noticed the branched form in old cultures, and Fischel called attention to the analogies between those organisms and the ray fungus of actinomycosis. Coppen Jones has contributed valuable information regarding these forms, and Burns, Marpmann, Bahr, Friedrich, and Semmer have confirmed the occurrence of such forms. These forms have been observed most frequently in old cultures, but Fischel and Coppen Jones have observed them in the sputa.

In preparations from the sputa, in two cases examined here, several bacilli presented true branching and also what I believe to be intermediate stages between the simple and the branched rod. While the typically straight or slightly curved rods were much the more numerous, yet every preparation showed some of the branching forms. In neither of these cases, however, were the intermediate and large branched forms so numerous or so typical as in a case previously reported by me in the Journal of Experimental Medicine, Vol. 111, No. 3, 1898.

Very common in many specimens of sputa were bacilli which resembled the branching forms and which may be called "false branching forms." On casual examination the resemblance which these bacilli (for they are multiple) bear to the true branching form is striking and it needs very careful focusing and good illumination, in many instances, to distinguish the difference. This appearance is due, not to a single bacillus sending off branches, but to two or more bacilli lying closely together and in such a position as to give the impression of true branching. Careful examination will, however, in almost every instance disclose a slight, unstained interval at the point where the suspected branching takes place. Such a minute examination should be made of every bacillus which appears to branch. Where no unstained interval can be detected by reason of one of the bacilli overlapping another, careful focusing will show a difference in the level of the bacilli where they overlap, and also a deeper staining at this point, whereas in the true branching form no such difference in level or staining can be detected. Another distinction exists in the fact that in the false branching type the bacilli forming the supposed branches are of the same length as the parent germ, whereas in the branching form the branches may be much longer or shorter than are the bacilli from which they spring.

Of the true branching bacilli several forms may be observed which are doubtless simply stages in the growth of the organism. In certain fields there are some bacilli which show at one or more points small knob-like projections, which cause a marked bulging in the outline of the organism. They need sharp focusing and a good light to be distinguished, as in some of them the bulging is very slight and only careful examinations will demonstrate it. The bulging or knob is generally situated laterally, but may be central. The bud, as it may be called, stains like the rest of the bacillus, and sometimes a very small, oval, unstained speck may be seen within it which resembles the unstained sections of the bacillus. Generally, however, no such appearance is present, the bud staining uniformly throughout. Is this unstained oval speck a spore? I believe not, any more than are the similar unstained spots which occur in tubercle bacilli in general and which are not regarded by the best observers as spores.

The budding form just described is of interest, as it is doubtless the first stage of branching, and I believe it to be present more often than is generally known. I have examined a large number of specimens of phthisical sputa since I first observed this form and have found it present in about 15 per cent of the cases, although in none was the branched form present. This result may appear contradictory if we assume that the budding is the first stage of the branching form, but it is probable that some unknown factor has hindered the further development of the process of branching.

From the budding forms to the fully developed branching forms is merely a stage of growth, evidenced by finding now and then a bacillus with very short branches, evidently outgrowths from the small elevations. The fully developed forms are bacilli, presenting one or more branches developing from the parent bacillus. There are many variations in the manner of growth. Occasionally bacilli are seen where the primary branches have given off one or more secondary branches.

Fantastic figures are often formed by the bacilli, caused by their curved form and the twisting of the branches which are given off. Nearly all the bacilli show well-marked stained and unstained areas, but it is noticeable that the branches present fewer of these, although some show unstained areas, irregular in outline. The bacilli are always larger than usual and often filaments are seen which are very long. The bacillus destined to branch becomes longer than usual and presents one or more knob-like outgrowths somewhere along its course. These outgrowths gradually lengthen and at last become true branches, which may in turn give off other branches.

We are not informed as to the special conditions which determine the development of branching forms of the tubercle bacillus. They have been most frequently observed under unfavorable conditions of environment, as in old cultures. Still, the recent observations of Babes and Levaditi and of Friedrich show that similar forms occur in fresh miliary tubercles. Various theories have been advanced as to the significance of the branching, filamentous, and club-shaped forms of the tubercle bacillus. Some have considered these to be simply degenerative or pathological forms of the bacillus, and without significance as to the classification of the organism. This is the view advocated by A. Fischer, who places these forms of the tubercle bacillus, as well as similar ones of the diphtheria bacillus, in the group of involution forms. There are several objections to this view, of which it will suffice to mention that the forms in question are not limited in their occurrence to old cultures and unfavorable conditions of environment. The opinion more generally advocated is that the occurrence of these forms necessitates some change of formerly accepted views as to the classification of the micro-organisms concerned. Thus, Klein suggests that the branching is a reversion to an ancestral type which presents mycelial growth. Fischer points out the analogies between actinomyces and the tubercle bacillus and Coppen Jones holds that both belong to the same group of organisms, but he leaves undecided whether this is among the hyphomycetes or some other class. He suggests the name tuberculomyces (hominis, avium, etc.) for the bacillus. Burns regards the branching shapes as involution forms when observed under parasitic conditions. He says "they pertain to the saprophyte growth form of a higher organism, which as a parasite in the animal body appears in the form of rods." Marpmann accepts the interpretation of Burns, employs the designation "mycobacterium tuberculosis," a name adopted by Lehymann and Newmann in their Grundriss der Bakteriologie.

The sharper differentiation within recent years of the streptothricee, cladothricee, and allied organisms has led several writers to express the opinion that the tubercle bacillus and diphtheria bacillus are very closely allied to the streptothricee, and some hold that they should be transferred to this group. Kruse, in the last edition of Flugge's Mikro Organismen, discusses this question, and although he does not venture to place the bacteria in question under the streptothricee he considers them to be very closely related to actinomyces and other organisms belonging to this group. Johan-Olsen places the tubercle bacillus under the streptothricee.

and accepts the name "tuberculomyces." The streptothrix group is characterized especially by branching filamentous forms of organisms, and is placed between the bacteria proper and the hyphomycetes, being more closely akin to the former than to the latter.

It is evident that further investigations are needed in order to enable us to come to any definite conclusions as to the significance of the branched forms considered, and for the present it would seem premature to adopt any radical change in the accepted classification of the tubercle bacillus.

Examination of fæces.—There have been 313 examinations made of the fæces, of which only 8 showed the presence of the amœba coli. This result has been surprising to me, as I had expected to find a large portion of the cases of dysentery returning from the Philippines to be amœbic in nature. That such is not the case, however, is evident by the exceedingly small number in which amœbæ were found and by the findings at autopsy. The greater part of the dysentery afflicting our troops in these islands is due to a different cause; the pathological lesions produced are dissimilar to those of amœbic dysentery, as are also the clinical histories of the cases. In a special report upon the pathology of dysentery, which will be submitted to you very soon, I have considered the character and microscopical findings of the diseased intestines and my observations upon a bacillus separated from the tissues in certain cases, and which is evidently identical with that separated by Flexner in cases studied at Manila and by Shiga in Japan. While it is hardly justifiable to claim that this organism is the cause of the disease, at the present time it is very probable that it is.

In the fæces of 4 cases large numbers of the cercomonas intestinalis were found. These little parasites belong to the protozoa, and were first found by Zambl. They are pear-shaped organisms, possessing a nucleus and from 2 to 8 slender, hair-like flagella, which propel the parasites through the material containing them. They move about very actively, often turning completely about and then rushing ahead by a series of peculiar jerky movements. They were present in these cases in large numbers and undoubtedly aggravated the intestinal condition. They have been observed by Davaine in cholera dejections, by Marchand in typhoid, and by Zunker in 9 cases of diarrhea. They apparently thrive in a diseased intestine and probably cause diarrhea and perhaps ulceration. This view is supported by Zunker, Grassi, and Marchand. I have seen these organisms in the fæces of several cases of diarrhea before, but never in such numbers as in these cases, nor have I ever observed them in the fæces of a healthy person.

Tænia segments or ova were not observed in any of the cases, nor were distoma nor ascarides. The anchylostoma duodenale and their ova especially were looked for, but no evidence of their presence was discovered, the ova not being found in the fæces nor the worm in the intestines at the autopsy. The nematode worm, rhabdonema intestinale or anguillula stercoralis, was found in the fæces of one patient suffering from chronic dysentery. The clinical history of the case and the description of the parasite is as follows:

Clinical history: Private J. B., Battery D, Sixth Artillery, age 20. Father died of typhoid fever; mother died of pulmonary tuberculosis at the age of 45; one sister died in infancy; has one brother living. Patient had chills and fever about six years ago. He was taken with diarrhea in Raleigh, N. C., in May, 1898. The attack lasted three weeks. Went to Cuba in December, 1898, and had a second attack while there in February, 1899. The diarrhea has persisted since that time, save during May of this year, when he was some better. Went to Manila in July, 1899, and did duty, despite 10 to 12 movements a day, until October 20, 1899, when he was sent to the hospital. At times his stools have contained blood and he has suffered from tenesmus. He was admitted to this hospital December 19, 1899. Examination showed marked anæmia and emaciation (weight 105 pounds), general tenderness over abdomen, slightly enlarged and tender liver, spleen normal in size, heart and lungs normal. The tenderness in the abdomen is most marked around the umbilicus, and he gives a history of having severe cramp-like pains in this region three weeks ago, but none of any severity since. On December 28, 1899, since taking thymol, his appetite has increased. His bowels move now 7 to 8 times a day and he has gained about 7 pounds in weight.

Microscopical examination.—A specimen of fæces was sent to the laboratory on December 20 to be examined for the Amœba dysenteriæ. The fecal matter was semiformed, bright greenish in color, and contained no blood or mucus. Careful search was made for the amœbæ but none were found. In one preparation, however, two specimens of the nematode worm, the *Rhabdonema intestinale* or *Anguillula stercoralis* was found. These worms measure about 2 mm. long by 0.44 mm. broad, with pointed tails and mouths furnished with three lips; they move sluggishly about,

and their structure could be easily made out. This worm was discovered by Normand, a French army surgeon, who found them in the excrements of French soldiers suffering from the so-called Cochin China diarrhea.

The history of the worm is briefly as follows: The mature worm lives in the intestinal mucous membrane of the duodenum and upper portion of the jejunum. Of the adult form only the female has been discovered. The female is easily distinguished by five or six elliptical eggs lying attached to one another about the center of the body near the vulva. The ova develop rapidly, and before the faeces leave the intestine the egg breaks and the minute embryos, measuring 0.2 to 0.3 mm. in length, are set free in the faeces. The ova are rarely found in the stools, and it is still more rare to find the adult worms. When the ova are found in the stools they occur in strings of three or more. Manson thus described the embryos after they leave the human body: "First, unless they gain access to nonputrefying fluid, they die; the faeces containing them, therefore, must mix freely with water. Second, if the temperature be low the embryo rhabdonema develops into a filariform larva, which, when swallowed by man, quickly assumes the parasite form. Third, if the temperature be high, the embryos develop into male and female rhabditic worms, and on being transferred to man become *R. intestinale*. These free mature rhabditic forms are what was formerly known as *Anguillula stercoralis*. They were found in faeces at post-mortem examinations and in the faeces after discharge."

The remarkable facts in this case are, first, that the worms occurring in the faeces are adult worms, and, second, no embryonic forms were found. No adult worms have been found in the faeces since the first examination. As to the pathological significance of their presence in the intestine, there is divided opinion. They were at first supposed by Normand and others to be the cause of Cochin China diarrhea. At the present time this theory has been abandoned, but the fact remains that they are only present in cases of chronic diarrhea, never being found in a healthy intestine, and are present in immense numbers, being found post-mortem, coiled up within or upon the intestinal follicles, the mucous membrane of the intestine being thickened, inflamed, and somewhat necrotic. It is impossible to believe that hundreds of these parasites could be present in the intestinal membrane without causing some pathological lesions, and it is not improbable that they at least aggravate intestinal disease, if they do not actually cause it. As to treatment, little can be said. The ordinary anthelmintics are wholly ineffective, and the only drug which has proved at all successful is thymol continued for a long time. In the case under consideration the administration of thymol has been followed by marked improvement.

Besides Cochin China, the *Rhabdonema intestinale* has been found in the West Indies, Brazil, Ceylon, Egypt, Bombay, Italy, and Germany. From the history it is impossible to say where infection took place in this case, but probably either in Cuba or in the Philippine Islands. At the writing of this report, two months after admission, the patient had not improved perceptibly, his diarrhea still continues, but no more adult worms have been found in the fæces.

Because of their diagnostic importance and the fact that they are often mistaken for other structures occurring in the intestinal tract, a brief description of the amœbæ of dysentery as observed here may be of interest. It is safe to say that among the parasites causing disease in man there is none which has been more often blamed unjustly for disease conditions than has the amœba coli. This is because it has so often been said to be present in the faeces when in reality it was not; other things slightly resembling it have been mistaken for it. Large intestinal epithelial cells, leucocytes, collections of anæmic blood corpuscles, monads, and the *cercomonas intestinalis* have all been gravely shown to me as the veritable amœba, and that by men otherwise well informed in such matters. To know the amœba one has to have seen it, and it is one of the most difficult of parasites to recognize from the common text-book description of it.

As is well known, Losch, in 1875, was the first to describe this organism, and numerous observers have since confirmed his researches. Among these may be mentioned Kartulis, Kruse, Koch, Manson, Councilman, Lafleur, Dock, and Leuckart. The organism belongs to the Protozoa, class Rhizopoda. It is simply a mass of protoplasm provided with a more or less distinct nucleus; hence the liability to mistake it for other similar unicellular organisms or even large cells. When at rest the organisms may be circular or oval in shape, if arrested while in motion may be irregular. It is more refractive than other cells occurring in the faeces, with the exception of the monads, and the protoplasm has a peculiar faintly greenish hue, almost like that of certain malarial crescents. Its size varies greatly, from 5μ to 35μ in diameter, but most of the amœbæ seen ordinarily measure from 15μ to 25μ in diameter. While many authorities claim that the amœbæ seen in any one case are all about the same size, this has not been my experience, and in the cases cited

above the amœbæ differed widely, some being very large, others small. The shape, also, varies much, some being perfectly circular, others oval, and others irregular in shape. As ordinarily described, the organism is said to consist of two parts, an inner, granular portion, called the endoplasm, and an outer portion, called the ectoplasm. This description has been the cause for mistaking the organism for large cells, the inner portion corresponding to the granular nucleus and the outer portion to the protoplasm. As a matter of fact, this differentiation can not be made out in all cases by any means, and very seldom in an amœba, which is not motile. While doubtless the two portions mentioned exist, yet too much stress is laid upon them, resulting in confusion, as only the experienced observer can in most instances distinguish them. The organism possesses a nucleus, but this is often difficult to make out, especially in moving amœbæ. It is situated somewhat to one side and is very refractive; its outline is often more or less irregular. The endoplasm forms most of the substance of the organism, is of a peculiar faint greenish hue, very finely granular, resembling finely ground glass, and generally shows a number of perfectly circular or oval so-called vacuoles. The vacuoles are spaces within the protoplasm of the organism, clear cut in outline, and collected together in groups. Many of them seem to contain two or four very refractive dots resembling micrococci. Although these spaces are generally called vacuoles, it is by no means certain that they are so. Certainly they do not resemble the vacuoles in blood corpuscles, and it always appears as though they do not penetrate entirely through the organism, their floor seeming to be formed by a thin veil-like layer of protoplasm. It is impossible to believe that these peculiar spaces are vacuoles, and it is by no means settled that they are so. These spaces vary slightly in size and in number in different amœbæ. The small amœbæ seldom show any, but the large ones seem often to consist of a collection of them surrounded by a small amount of the protoplasm. It would seem from this that such an amœba might be a sporulating body, as the oval spaces resemble very strongly the segments of the sporulating malarial plasmodia. The amœbæ generally show more or less material within their protoplasm, which they have absorbed. They often contain red blood corpuscles, bacteria, pigment particles, etc. Often these inclusions are so numerous that the structure of the amœba is entirely hidden. When it can be seen the ectoplasm consists of a narrow rim of a clear, light-green color surrounding the darker endoplasm.

Now, as to the mobility of the amœba. It is always motionless in fæces which have not been kept warm, as a temperature below 75° F. renders it immotile, but it is often possible, after preparing a specimen upon a slide from such fæces, to render the organism motile by gently warming the slide over an alcohol lamp. The motility of the organism varies, but it is generally a slow amœboid motion, it throwing out rounded protoplasmic processes, exactly as does the leucocyte. These processes are always perfectly clear and formed by the ectoplasm, and these are often the only portions of the organism which show the differentiation into ectoplasm. In rare instances the movement is rather rapid, the processes being thrown out quickly and the whole organism moving in an eccentric, jerky manner. More often, however, the change in position is very gradual, and only careful watching will detect it. Often, also, the organism does not change its position, but merely its shape, the protoplasmic processes being projected and retracted, sometimes so very slowly that only close scrutiny will detect it. Often, also, a peculiar undulatory motion of the border of the organism is noted, exactly like that occurring in the malarial parasites.

When the temperature is that of the body the amœbæ are most active and progress by an almost imperceptible projection, and flowing into such projection of the mass of the organism. When, however, the temperature is low it can be seen that the protoplasmic projection gradually becomes larger, until at last the granular endoplasm flows into it. This process is repeated, and thus the organism alters its position.

The color and the refraction of the amœba should serve to distinguish it from cellular material, as intestinal epithelium, it being of a peculiar faint-green color and very refractive, which is marked enough so that even with a two-thirds objective it can be picked out from the surrounding cellular matter. These properties, however, do not seem to distinguish it from the monas and cercomonas, which are also greenish in color and refractive, but they are much smaller than the large amœba and much more actively motile, not throwing out protoplasmic processes, but moving by means of flagella. To one who has seen the amœba these organisms could never be mistaken for it, but mistakes have been made often when the observer had only the text-book description to guide him. To sum up, then, the amœba is a round, oval, or irregular protoplasmic body, varying in size; motile or immotile, the motility amœboid in character when present being generally moderate; pale or faint green in color; refractive, with a sharply cut border, and containing circular or oval lighter

colored spaces, known as vacuoles. In some a darker colored nucleus can be distinguished, and in the immotile organisms a darker colored central or eccentric portion, containing the vacuoles and comprising the greater part of the parasite, and known as the endoplasm, can be seen surrounded by a narrow or much smaller layer, lighter in color and clear, known as the ectoplasm.

Nothing is known as to the method of reproduction of the parasite, but it is generally believed to be by sporulation. If this is so, it is probable that the so-called vacuoles are in reality spores, the mother parasite eventually rupturing, and thus setting them free. Reasoning from what occurs in other similar organisms, this is the most probable method of reproduction. It is impossible, in observing a large circular amœba, filled with the oval or round spaces so that only a thin strip of protoplasm remains visible, to resist the impression of its resemblance to the large segmenting tertian plasmodia, just before the segments separate and become free. Another interesting analogy between the two parasites is that in both a solution of sulphate of quinine arrests all motion immediately and destroys them.

It is not a very difficult matter, where the amœbæ are numerous in the fæces, to obtain good stained specimens if sufficient care be taken in their preparation. While undoubtedly the amœbæ show to greater advantage when stained in sections of tissue, yet the method of staining them in fæces is most practicable and useful, and if the smears are made sufficiently thin the organisms will show very perfectly. So little is said in the recent text-books regarding the appearances presented by the stained amœbæ that a somewhat detailed account of their staining reactions is of interest. Like all protozoan organisms, the nucleus stains with more or less difficulty, but I have found that carbolic fuchsin stains it, as well as the nucleolus, very easily and deeply, while methylene blue stains it dimly and often not at all.

I have tried a large number of different staining solutions, but have found that only three are really worthy of use, in that they are sure, rapid, and show the minute structure of the amœba well. These are: Loeffler's methylene blue solution, carbolic fuchsin solution, and thionin solution. Of these solutions Loeffler's methylene blue is the quickest and best stain for general use, while the carbolic fuchsin solution is by far the best where it is desired to stain the nucleus and nucleolus, as well as certain peculiar bodies within the protoplasm of the amœba. The thionin differentiation method recommended by Mallory, which often gives beautiful results in staining amœbæ in tissue, gives but fair results in the staining of the organisms in fæces, and can hardly be said to be differential, as other structures in the fæces take and hold the stain. It is a useful stain, but methylene blue is far better and much more easily applied.

Having found a specimen of fæces containing numerous amœbæ, the smears are prepared as follows: Several cover glasses are thoroughly cleaned and placed in a row upon the table. With a sterilized platinum loop a small flake of mucus is picked out of the fæces and placed upon a cover glass. This is repeated, a minute flake of mucus being placed upon every other cover glass. The intervening clean cover glass is then dropped gently down upon the glass containing the mucus, and then the two are slid apart, very gentle pressure being used in doing so. By proceeding in this way a dozen or more very even smears can be secured in a few minutes time. The smears are then placed face up in equal parts of alcohol and ether and allowed to harden for thirty minutes. If the fæces are warm when the preparations are made, many of the amœba will be hardened while undergoing amœboid motion. After hardening the smears are ready to be stained.

Loeffler's alkaline methylene blue solution.—The smears are stained in solution for from three to eight or ten minutes; about five minutes gives the best results. They are then washed in distilled water and mounted in Canada balsam. The amœbæ take the blue stain very well, staining almost as deeply as the nuclei of the epithelial cells. In such stained preparations three stages of the amœbæ can be detected. The small amœbæ, staining comparatively uniformly; larger ones, staining less uniformly and containing one or more vacuoles, and still larger ones, riddled with vacuoles, staining very deeply. The smaller or young amœbæ stain much more intensely than the larger ones, and with the methylene blue seldom show a nucleus. No vacuoles can be seen, nor do they often contain red blood cells. The protoplasm is of a rather dark-blue ground color, with small oval or round lighter blue areas, but stain almost uniformly throughout. No distinctions can be traced between the ecto and endoplasm. These small amœbæ are generally round, but sometimes show small pseudopodia, which generally stain very intensely. Some of the small amœbæ show a peculiar mottled appearance, light and dark stained areas alternating throughout their protoplasm. These small forms are evidently young amœbæ. In all the preparations the most numerous forms of the amœbæ are those now to be described. They are large, generally round or oval in shape, although if

the preparations are made when the amœbæ are active many of them are irregular in shape and showing pseudopodia. The protoplasm of these amœbæ stains irregularly, but there can be no distinct differentiation into ecto and endoplasm made. One portion of the amœba stains very densely, and there is a gradual shading off into a lighter blue color. In the irregular forms this is most noticeable, the pseudopodia staining very dimly, due to the fact that they are composed of ectoplasm, which takes the stain lightly. Some of the pseudopodia, however, stain very intensely, due, probably, to the fact that the endoplasm had flowed into them just before hardening. These fully grown amœbæ show from one to three or more large vacuoles, which are entirely unstained, but besides these there are numerous small oval or round, very dimly stained areas scattered throughout the protoplasm, which are evidently not vacuoles, and correspond to the same areas observed in the very young forms. Scattered between the oval, dimly stained areas are very deeply stained small portions of protoplasm. The staining phenomena of these amœbæ exactly resemble those of the large segmenting tertian malarial plasmodia. The vacuoles and the dimly stained areas are entirely distinct, the dimly stained areas being oval or round, much smaller than the vacuoles, having a dim outline, and evidently not penetrating the organism, as do the vacuoles. Many of these amœbæ contain red blood cells which do not stain, but show as round or irregular light areas scattered through the protoplasm of the parasite. In a few of the amœbæ very deeply stained, almost black, oval-shaped structures can be seen, generally arranged near the periphery of the organism and resembling bacilli, save that they are too large and are often irregular in shape. In preparations stained for some time some of the large amœbæ show a very deeply stained, almost black nucleus. Surrounding this nucleus is sometimes seen a more lightly stained area with a deeply stained, almost black border. Besides blood corpuscles, the protoplasm of these amœbæ contains numerous more deeply stained, almost black granules and rods and dots which are evidently bacteria of various kinds. Besides the two forms of amœbæ described, large round forms are seen, containing numerous vacuoles and staining more or less dimly. No nucleus can be demonstrated in these forms, nor can the small oval unstained areas be seen. In most instances these amœbæ are simply riddled with vacuoles, the amœba consisting of a stained shell perforated by vacuoles. Many of these show evidences of fragmentation. These are probably degenerate amœbæ undergoing, just as does the plasmodium of malaria, vacuolization and fragmentation. It is a significant fact that such amœbæ never show any inclusions in the way of blood corpuscles or bacteria.

Smears are stained with carbol fuchsin for from five to ten minutes, washed in water, and mounted in Canada balsam. This stain is especially useful in demonstrating the nucleus, which stains very beautifully. The same structures are seen in amœbæ stained by this method as by methylene blue, but, in addition, the nucleus, nucleolus, and certain other details can be made out. The nucleus stains a deep red, is usually situated eccentrically near the edge of the parasite, probably at the juncture of the ecto and endoplasm, but it may be more central. It contains a small, more deeply stained nucleolus and a few almost black granules, while the nuclear substance contains minute, more deeply stained areas. The nucleus is oval in shape and regular in outline. As noted before, the large amœbæ, containing great numbers of vacuoles, do not show any nucleus.

Besides the nucleus and its contents the fuchsin stain demonstrates within the protoplasm of many of the amœbæ some very peculiar bodies, the nature of which it is impossible to conjecture. Scattered irregularly through the protoplasm are variously shaped particles stained a deep, brownish red, and especially numerous near the nucleus. These particles are oblong in shape, as a rule flat, and much larger than any bacterium. They present often a fractured extremity, as though they were crystalline in structure, and it may be that they are certain crystals absorbed from the fæces.

In all preparations from the fæces, however stained, amœbæ are seen evidently undergoing fragmentation. Numerous knob-like outgrowths are seen almost entirely separated from the parasite, and some which are separated. These fragments stain deeply, and the fragmenting parasite usually shows a normal appearing nucleus, thus showing that the process is a degenerative and not a reproductive one.

Little need be said of the thionin stain. It gives similar results to those just described, and is not nearly as satisfactory as the methylene blue or carbolic fuchsin.

This much can be said to have been demonstrated by the study of stained specimens of the amœbæ:

1. That vacuolization is a degenerative process, as the young amœbæ show no vacuoles, the full-grown, healthy ones few, while the amœbæ in which they are

most numerous are degenerate bodies, showing neither a nucleus nor inclusions of any kind.

2. That there occur in all but the degenerate forms of amœbæ small round or oval unstained areas, uniform in appearance, and most numerous in the large, full-grown forms, and entirely absent in the vacuolated shells of amœbæ. These areas resemble the same areas observed in stained segmenting malarial plasmodia which are in them, due to the young spores, which take the stain but faintly. Reasoning from analogy, it may be seen that these areas in the amœbæ are also spores.

3. That in the protoplasm of the amœbæ there occur peculiar structures, evidently not bacterial in nature, the significance of which it is impossible to decide. It may be that they are certain crystals which occur in the faeces and which have been absorbed by the amœbæ.

I have continued experimental work upon the bacillus which I separated from 3 cases of dysentery in cultures from the intestinal ulcerations and spleen, with especial reference to the agglutination reaction of the bacillus with the blood of cases of dysentery. Of 10 cases of dysentery which were in serious condition in that they were all bed cases and having numerous bowel movements, 9 gave a marked agglutination reaction in a dilution of 1 to 30 within ten minutes, and the 1 remaining gave a slight reaction in the same dilution in fifteen minutes. Of 10 cases of convalescent dysentery, 6 gave a reaction within fifteen minutes. Thus of 20 cases diagnosed as dysentery 16 gave a reaction with the dilution of 1 to 30 within fifteen minutes. These results were very interesting, and undoubtedly show an etiological relation between this bacillus and dysentery.

I have also been able to compare my bacillus with a culture of the bacillus which Professor Flexner separated from dysentery cases in Manila, and which he has kindly sent me, and find that the bacillus which I have separated from cases here is identical with his, and, furthermore, that in all the above agglutination tests bacilli from both his and my cultures gave the same results.

I will report further upon this subject, especially as to the results of inoculation of guinea pigs with the bacilli in question.

Examination of cultures.—Cultures have been inoculated and examined from 46 cases of suspected diphtheria, of which 13 proved positive, the Klebs-Loeffler bacillus being found, while 33 proved negative.

Examination of post-mortem material.—Since November 1, 1899, I have embedded in paraffin and cut sections of all diseased organs in every case coming to autopsy at this hospital. Organs have been sectioned and preparations mounted from such organs. While this has entailed much work upon the laboratory, I feel that it is more than repaid by the accurate and complete pathological record which such work has enabled us to make.

The microscopical findings in the cases have been added to the post-mortem records and forwarded each month to the Surgeon-General of the Army.

Miscellaneous examinations.—Twenty-four miscellaneous examinations have been made. These examinations include work upon the influence of anæsthetics, upon the composition of the urine, and the use of nuclein in chronic malarial infection. This work will be reported upon as soon as possible.

The laboratory is well supplied with all necessary apparatus, which is in good condition.

There have not been as many special investigations carried on in the laboratory as would be desirable, or as there were opportunities for, due entirely to the time which the routine work in the laboratory requires.

HOSPITAL SHIPS.

The Relief.—During the past year the hospital ship *Relief* has been on duty in connection with military operations in the Philippine Islands. Experience had shown that this vessel did not have a sufficient coal-carrying capacity to undertake the voyage across the Pacific without some risk. She was therefore sent to Manila for duty in the Philippine waters. The following report, dated June 30, 1900, by Maj. H. O. Perley, surgeon, United States Army, to the chief surgeon, Division of the Philippines, shows the value of the services rendered by this vessel:

On January 1, 1900, the ship was lying in Manila Bay, as a floating hospital, with 107 sick and wounded officers and men, collected on our trip in December, 1899, from

Dagupan, San Fernando de Union, San Fabian, Vigan, and all ports in northwest Luzon. They were the seriously wounded and sick from the commands of Generals Young and Wheaton, who had just made very severe and exhausting campaigns in the north.

On the 13th of this month we proceeded, under your orders, to Bacoor, Niac, and Batangas, south Luzon, taking off the wounded and sick from General Schwan's command as they progressed southward, and furnishing medical and surgical supplies for the hospitals established at the different places, as well as for the moving command. From Batangas we returned to Lemeri and Taal, established a field hospital there from the supplies on board, and took off the sick and wounded. We returned to Manila January 27, having 222 patients on board. As the *Relief* had not been docked or repaired since September, 1899, it was deemed necessary that we should proceed to Hongkong (the nearest suitable place for the purpose), and in compliance with your orders we put in coal, provisions, and an abundance of medical and surgical supplies and vaccine virus. We left Manila February 7, touching at the ports of Subig, Iba, Dagupan, San Fernando de Union, Vigan, and Aparri (all seaport and garrisoned towns). We left an abundance of supplies at each place, and from Aparri went direct to Hongkong, China, where we arrived on the 13th of February, having on board at the time 73 convalescent patients. On account of the crowded condition of the dockyard we were obliged to remain three weeks, and even then the repairs were not satisfactorily done.

While in Hongkong the ship was carefully inspected by many foreign officers, both line and medical, and their admiration for her fittings and general usefulness as a floating military hospital was outspoken. We left Hongkong March 4, and revisited Aparri, Loag, Vigan, San Fernando de Union, Dagupan, Iba, and Subig on our return, taking off the patients who were selected for discharge on surgeon's certificate of disability or who required the aid of a specialist in Manila. In all, 44 patients were collected on this trip. At every place we stopped the medical department was carefully inspected and a report rendered to you.

From March 12 to 25 the ship was a floating hospital in Manila Bay. On the latter date, after having taken on an abundance of supplies, both medical and surgical, vaccine virus, and water filters, the ship started south. We had when we left Manila 8 convalescents on board.

The following ports were visited, and at each supplies as required were put off, and patients, particularly those who were selected to go to the United States and those requiring the aid of a specialist, were taken on board. Vaccine virus and water filters were furnished as needed: Nasugbu, Lemeri, Taal, Batangas, South Luzon Island; Iloilo, Kapiz, Panay Island; Bacalod, Dumaguete, Negros Island; Jolo, Sulu Island; Port Isabela, Basilan Island; Zamboanga, Cotta Bato, Dapitan, Iligan, Cagayan, Mindanao Island; Cebu, Cebu Island; Romblon, Romblon Island.

Our arrival at Cagayan, Mindanao, was very opportune. There had been an unexpected midnight attack on the garrison forty-eight hours before our arrival, and the hospital was filled with severely wounded men. These were taken on the *Relief*, their wounds re-dressed, and the patients cared for. Supplies were put off in abundance for the hospital.

It was your intention that the ship should also include the ports in Leyte, Samar, and southeastern Luzon on this trip, but the scarcity of water and our inability at the time to obtain coal rendered it necessary for us to return to Manila, which we did, arriving on the 21st of April.

The medical department of every post visited was carefully inspected by Maj. Frank R. Keefer, surgeon, United States Volunteers, who was detailed by you for this purpose. Patients were collected from the different ports. On April 26, after having taken on medical and surgical supplies, the necessary coal and water, etc., we left Manila to complete the southern trip.

The following ports were visited: Romblon, Romblon Island; Baibai, Okmoc, Leyte Island; Tacloban, Catbalogan, Kalbayok, Samar Island; Legaspi (Albai Gulf), Nueva Caceres, Tobaco, Sorsogon, Donsol, Lucena, southeast Luzon.

Supplies were furnished, the selected patients taken off, and vaccine virus and water filters were given out as required. At each station from which it was found that small substations were regularly supplied by the quartermaster's boats supplies in sets were furnished.

The *Relief* returned to Manila on the evening of May 10, and from that date to the 31st she was lying as a floating hospital in Manila Bay.

From January 1 to May 31, 1900, the ship traveled 6,375 nautical miles, and although at times in very rough weather and in uncharted regions, we have fortunately met with no accident. In coming away from the China coast we ran into a very hard blow, but the ship showed her seaworthiness.

The following table exhibits the work done:

Sick on board January 1, 1900	107
Sick on board May 31, 1900	194
Sick received between January 1 and May 31, 1900	743
Sick returned to duty between January 1 and May 31, 1900	408
Sick died on board between January 1 and May 31, 1900	10
Sick sent to United States between January 1 and May 31, 1900	69
Sick transferred to other hospitals	166

When it is remembered that only serious cases have been transferred from the post hospitals to this ship, the large number returned to duty and the small number of deaths on board illustrates better than words the necessity of a floating hospital fitted up with all modern appliances in these islands. I know of no means of treatment which will restore debilitated men, worn out with hard marching and malaria, quicker to duty than a sea trip and good food.

The special-diet kitchen on the ship has been our main reliance in the treatment of most of our chronic dysentery cases, and the results have been very satisfactory.

The value of a hospital ship in these islands can not be expressed in statistics. To be able to furnish all needed supplies to the seaport garrisons, which are otherwise inaccessible, is a matter of great importance. To take off the wounded and sick of a marching column and to meet them at designated places with all the necessary supplies, thus relieving the general commanding of anxiety for and care of the wounded, is, as one general officer expressed to me, "a marked advance in modern warfare, if not in humanity."

In concluding this report I can not but express my appreciation of the skill and care exercised by Captain Harding, sailing master, and the ship's officers and crew, in navigating the ship and in making the dangerous landings. Twice we have been under fire in bringing off the wounded, and every man of the sailing crew did his duty.

The Missouri.—As stated in my last annual report, the hospital ship *Missouri* sailed for Manila by the eastern route September 30, 1899, with a full staff of medical officers, hospital corps men and nurses, members of the Hospital Corps en route for service in the Philippines, and stores of medicines and medical and hospital supplies and property. She arrived at Manila, after an uneventful voyage, November 28, 1899, and on December 31 sailed for San Francisco, Cal., having on board 269 patients, 13 of whom died before the vessel reached her destination on February 13, 1900. Here it was reported that the repairs necessary for the continuance of this ship in service would cost a considerable sum and would occupy much time. Meanwhile the Quartermaster's Department had established a fine line of transports between San Francisco and Manila, each of which had a well-equipped hospital. Sick men in numbers not to exceed the capacity of each vessel could be returned comfortably to the United States on these transports. I therefore recommended the disuse of the *Missouri* as a hospital ship, and she was accordingly turned over to the Quartermaster's Department.

The *Terry* was at one time proposed as a suitable vessel for hospital purposes in Cuban waters; but the conditions in Cuba became so changed that it did not appear to me to be necessary to secure a hospital ship in place of the *Mid* for service in connection with the troops in garrison in that island.

HEALTH OF THE ARMY.

HEALTH OF THE ARMY IN 1898.

In my last annual report I submitted the medical and surgical statistics of the Regular Army for the calendar year 1898. It was not practicable at that time to present the statistics of the Volunteer Army

for the same period. The act of Congress approved April 22, 1898, which authorized the President to raise a volunteer force, required the medical records and reports of these troops to be deposited with the Record and Pension Office. This had accordingly to be done before it was possible for the clerical force at my disposal to use the records for statistical purposes. Arrangements were subsequently made, however, with the chief of that office by which I was enabled to card and check the cases from the sick reports of the State volunteers. It was my desire to have presented these statistics as a supplement to my last annual report, but the work involved in classifying and tabulating so large a number of cases additional to those of the calendar year 1899 could not be completed until my present report became due. I therefore submit in this report the delayed statistics of the volunteer force for 1898, together with those of the Regular and Volunteer armies for the calendar year 1899.

During the year 1898, 217,072 cases of disease and injury were reported by our medical officers serving with volunteer troops. This is equivalent to 2,145.83 admissions to sick report during the year for every thousand men present in the command, or a little over two entries on sick report per man. Of this admission rate 2,037.20 were caused by disease and only 108.63 by injuries. Malarial fevers and diarrheal diseases constituted a little over one-half of the admissions, the rate for the former having been 573.56 and for the latter 453.10. The entries for typhoid fever numbered 16,796, equivalent to an admission rate of 166.03 per thousand men during the year. The rate for yellow fever was 5.58 per thousand; for measles, 61.46, and for smallpox a total of 73 cases gave a rate of only 0.72 per thousand men.

Of the 10,989 injuries reported, one-tenth were considered due to exhaustion from exposure and fatigue. It is an interesting fact that more men were ruptured than injured by gunshot. The former numbered 795, the latter 600, giving rates, respectively, of 7.86 and 5.93 per thousand of strength.

In the Regular Army in 1898 the admission rate, 2,146.94 per thousand of strength, was the same as in the Volunteer Army, but the ratios of the causes of admission were not identical. Disease caused a rate of 1,937.71, and injury 209.23. On account of the service of so large a proportion of the regular troops in Cuba, malarial infection was the cause of nearly one-third of the whole number taken on the sick reports, the admission rate for these diseases having been 694.64 cases for every thousand men of the strength. Diarrheal diseases constituted one-seventh of the cases admitted. The entries for typhoid fever numbered 4,130, equal to 88.56 per thousand men. The rate for yellow fever was 12.95, for measles 25.09, and for smallpox 0.40.

Of 9,758 injuries, only 308 were reported due to exhaustion from exposure and fatigue; 1,457 were gunshot wounds, giving a rate of 31.24 per thousand men, and 255 were cases of hernia, equaling a rate of 5.47.

The total number of discharges for disability in the Volunteer Army was 1,506, equal to an annual rate of 14.89 per thousand men. The rate for disease was 12.60; for injury 2.28. The largest individual rates were for venereal cases, 1.51; for consumption, 1.17; for hernia, 1.13, and for rheumatism 1.11.

The rate of discharge for disability among the regular troops was 11.58 per thousand men—for disease, 7.40; for injury, 4.18. Hernia occasioned a discharge rate of 1.22, rheumatism 1.05, consumption 1.01, and venereal diseases only 0.02.

The total number of deaths among volunteers admitted to sick report in 1898 was 2,851, equal to an annual rate of 28.18 per thousand men. Of these deaths 2,664, or 26.33 per thousand men, were due to disease, and 187, or 1.85 per thousand men, to injuries. Typhoid fever caused the largest number of deaths, 1,738, equivalent to 17.18 deaths per thousand men. Gunshot wounds occasioned 1.17, malarial fevers 1.96, diarrheal diseases 1.29, yellow fever 0.73, and injuries other than gunshot 0.68, leaving 5.17 for distribution among all other causes of fatality to make up the total death rate of 28.18 per thousand men during the year.

With the statements made in the last paragraph the following concerning the regular troops in 1898 may be compared:

The total number of deaths was 1,285, equal to a rate of 27.55 per thousand men. The death rate from disease was 22; from injury, 5.55. The largest individual item in the death rate was 9.74 deaths from typhoid fever in every thousand men. Gunshot wounds occasioned a death rate of 3.94; malarial fevers, 3.24; diarrheal diseases, 2.14; yellow fever, 1.50, and injuries other than gunshot, 1.61, leaving 5.38 for distribution among all other causes of fatality to make up the total death rate of 27.55 per thousand of men for the year.

In the year 1897, a year of peace, the death rate from all causes was 5.11, and the average annual rate for the previous decade was 6.99. The contrast here requires no comment.

In 1898 the volunteer troops serving in the Philippine Islands had the lowest admission rate, 1,832.10 per thousand of strength; those serving in Cuba the highest, 4,070.34, while the rate in Porto Rico, 2,175.92, did not differ much from that of the troops in the United States, 2,071.65. The high rate in Cuba was due to the excessive prevalence of malarial fevers, the rate for which alone amounted to 2,555.02, and yellow fever added 121.72 to the rate; but the admission rates for most other diseases were either not in excess or were actually lower than those of the Volunteer Army as a whole. Thus the rate for diarrheal diseases was 372 as compared with 453.10 among the volunteers generally, and that for the diseases of the respiratory organs was 43.88 as compared with 134.02. The volunteers in Cuba had also the highest death rate, equivalent to 86 per thousand of strength, the rate for disease being 73.65 and for injury 12.35, gunshot wounds having contributed 11.91 of the 12.35. The fatal diseases were typhoid fever, which caused a death rate of 22.05 per thousand men; yellow fever, which occasioned a rate of 15.88; malarial fevers, 14.77, and diarrheal diseases, 9.26, these four items constituting 61.96 of the total rate for disease—73.65.

Among the regular troops in Cuba in 1898 the death rate was exceedingly high, 98.16 per thousand men as compared with their admission rate of 2,631.76. This means that during their service on this island slight cases were infrequent, or, which is more likely, were not taken upon sick report. The death rate from disease was 61.15; from injuries, 37.01, gunshot wounds having contributed 33.33 of the latter rate. The fatal diseases were typhoid fever, which caused a

death rate of 14.17; yellow fever, which occasioned a rate of 17.57; malarial infections 13.12, and diarrheal diseases 9.97.

The volunteers in Porto Rico in 1898 had a death rate of 52.09, of which 49.43 was caused by disease. Typhoid fever was the deadly factor, it being held responsible for 40.66 deaths per thousand of strength. But for this epidemic of typhoid fever among these troops their medical record would have been comparatively good.

The regular troops also suffered from this epidemic, their total death rate having been 41.45 and their rate from disease 39.38, of which 22.80 was caused by typhoid fever and 5.70 by malarial diseases.

The volunteer troops serving in the Philippines in 1898 had an admission rate of 1,832.10 per thousand men, 1,719.73 from disease, and 112.36 from injury; 422.47 from malarial diseases, and 398.63 from diarrheal diseases. The death rate, 24.70 per thousand men, was constituted by 21.27 occasioned by disease and 3.43 by injury, 2.86 of the latter being the results of gunshot injuries. Typhoid fever caused deaths equivalent to 9.28 per thousand for the year; diarrheal diseases, 2.86; smallpox, 2.14, and malarial fevers, 1.43.

Among the regular troops the death rate in the Philippines was 22.74, 18.60 from disease and 4.13 from injury, 3.10 of the latter from gunshot. Typhoid fever caused a death rate of 7.58; smallpox, 2.07, and malarial fevers and diarrheal diseases 1.72 each.

Among volunteers serving in the United States in 1898 the death rate amounted to 24.41 per thousand of mean strength for the year, of which 23.29 was due to disease and 1.11 to injury. Typhoid fever was the prominent cause of death, 16.59 of the total rate having been reported as due to it. The rate caused by malarial fevers was 1.26, by pneumonia 1, and by diarrheal diseases 0.60.

The death rate of the regulars in the United States in 1898 was 20.14, 17.45 from disease and 2.69 from injuries, of which 1.21 were from gunshot. Typhoid fever caused a rate of 8.79; malarial fevers, 2.24, and diarrheal diseases, 1.39. A large proportion of the cases which gave the high death rate from disease were imported by the regular troops from Cuba.

HEALTH OF THE ARMY IN 1899.

During the calendar year 1899 there were 229,885 admissions to sick report recorded in a mean strength of 105,546 regulars and volunteers. This is equivalent to a rate of 2,178.06 per thousand of strength, as compared with 2,146.18 per thousand during the year 1898 and with 1,236.66, the mean annual rate of the decade 1888–1897. Of the admission rate for the year, 714.99 was constituted by malarial diseases, 380.69 by diarrheal diseases, and 192.48 by injury, of which 21.56 admissions per thousand men resulted from gunshot. Typhoid fever contributed only 20.69 cases per thousand of strength. Of the admission rate for 1898, malarial fevers constituted 611.78, diarrheal diseases 388.62, injuries 140.38, of which only 13.92 resulted from gunshot. Typhoid fever contributed 141.59 cases per thousand of strength.

The number of discharges for disability in 1899, 2,320, constituted 21.98 per thousand of the strength, as compared with 14.13 in 1898 and with 16.57, the mean annual rate of the preceding ten years. The principal causes and the rates contributed by each were: Gunshot wounds

2.14, other injuries 2.33, venereal diseases 2.61, consumption 1.80, rheumatism 1.52, heart disease 1.37, malarial diseases 1.10, and diarrheal diseases 0.90. The principal causes of the discharge rate of 1898 were: Gunshot wounds 0.77, other injuries 2.11, rheumatism 1.15, consumption 1.12, venereal diseases 1.05, diarrheal diseases 0.44, and malarial fevers 0.43.

The deaths in 1899 amounted to 1,945, equal to a rate of 18.43 per thousand, as contrasted with 27.99 during the year 1898 and with 6.69, the mean of the preceding decade. The principal causes of death and the rates per thousand men contributed by them were: Gunshot wounds 5.10, other injuries 1.57, typhoid fever 2.44, diarrheal diseases 2.14, malarial diseases 0.99, pneumonia 0.94, and variola 0.80. The prominent causes of death and the rates contributed by them in 1898 were: Typhoid fever 14.83, gunshot wounds 2.04, other injuries 0.98, diarrheal diseases 1.45, malarial infections 0.97, and pneumonia 0.92.

Troops serving in Cuba had the highest rate of admission, 2,749.74 per thousand, as against 3,413.54 per thousand in 1898, the result of exposures during the active service of the Santiago campaign. The lowest admission rate during the past year, 1,677.51, was given by troops serving in the United States, but this, which must be regarded as a high rate when contrasted with the rates of the preceding years of peace, together with the still higher rate, 2,062.82, given by troops in the United States in 1898, was due to sickness brought home from service in the islands. The high rate of discharge for disability at the home stations is attributable to the same cause. The highest death rate during the past year, 30.58 per thousand men, was reported from the Pacific Islands. One-half of this was caused by injuries, gunshot injuries being responsible for the death of 12.60 men per thousand of strength. The highest death rate in 1898, 91.55 per thousand, was reported from Cuba; of this rate, 67.94 was caused by disease and 23.61 by injury, gunshot injury being responsible for the death of 21.69 men per thousand of strength.

Rates of the regulars and volunteers in 1899 compared.—During this year from the Regular Army, having a mean strength of 64,446 officers and men, there was admitted to sick report a total of 150,949 cases. This is equal to a rate of 2,342.26 per thousand of strength. Of this rate, 2,125.74 was due to disease and 216.52 to injury. Malarial diseases occasioned 633.31 of the admission rate; diarrheal diseases, 414.39. Typhoid fever caused a total of 1,481 entries, equivalent to 22.98 per thousand men. Measles gave a rate of 23.54 and smallpox a rate of 2.11 per thousand men. Of 13,954 injuries, 762 were due to fatigues and exposures, making a rate of 11.82 per thousand of strength; 1,016 cases, or 15.76 per thousand men, were gunshot injuries, and 488, or 7.57 per thousand, were cases of hernia.

During the year 1899, 78,936 cases of disease and injury were reported as having occurred in the Volunteer Army, the mean strength of which was 41,100. This is equivalent to an admission rate of 1,920.49 per thousand men, or rather less than 2 entries per man during the year. Of this rate, 1,765.72 was caused by disease and 154.77 by injury. Malarial diseases occasioned one-fourth of the admissions, the rate for these diseases being 482.02; diarrheal diseases also were prevalent, the rate being 337.26, but both of these rates are considerably smaller than the corresponding rates of 1898. The entries for typhoid fever num-

bered 703, equal to an admission rate of 17.10 per thousand men. Only 5 cases of yellow fever appear upon the records of this year. Measles gave a rate of 30.12 per thousand men, and 211 cases of smallpox occasioned a rate of 5.13 per thousand. Of 6,361 injuries reported, 714 were due to fatigues and exposures, making a rate of 17.37 cases per thousand of strength; 1,260 cases, or 30.66 per thousand men, were gunshot injuries, and 317, or 7.71 per thousand, were cases of hernia.

Discharges of regular soldiers on account of disability in 1899 amounted to 1,767 cases, 372 of which were cases of injury, equal to the respective rates of 27.42 and 5.77 per thousand of strength. Venereal diseases caused 3.19 of the total rate; gunshot wounds, 2.73; consumption, 2.30; heart disease, 1.88; rheumatism, 1.72, and hernia, 1.49.

The discharges on account of disability in the Volunteer Army amounted to a total of 553 cases, equal to a rate of 13.45 per thousand of strength, of which 11.02 was due to disease and 2.43 to injury. Venereal diseases caused 1.71 of this rate; gunshot wounds, 1.22; rheumatism, 1.12; consumption, 1.02, and hernia, 0.71.

The number of deaths from all causes among the troops of the Regular Army amounted to 1,202, equivalent to 18.65 per thousand of strength; 380 of the deaths, constituting 5.90 of the total death rate, were due to injury and 248, or 3.85 per thousand, to gunshot wounds. The principal diseases which caused this mortality were typhoid fever, with 180 deaths, giving a rate of 2.79 per thousand men, and diarrheal diseases, with 152 deaths, causing a rate of 2.36.

The number of deaths reported from the Volunteer Army was 743, of which 324 were due to injuries and 419 to disease. The death rate from all causes was 18.08; from disease, 10.20; from injuries, 7.88. The principal causes of this mortality were diarrheal diseases, which contributed 1.95 to the rate; typhoid fever, 1.90; smallpox, 1.44; pneumonia, 1.22; malarial fevers, 1.05, and gunshot injuries, 7.06.

The regular troops in Cuba in 1899 had a mean strength of 11,969 officers and men, from which 35,401 cases were admitted to sick report, the equivalent of 2,957.73 per thousand of strength. Of this rate, 2,690.77 was due to disease and 266.94 to injuries, only 3.09 being caused by gunshot. Malarial fevers constituted 1,132.76 of the total admission rate; diarrheal diseases, 475.82, and venereal diseases, 171.28. Three hundred and five men were discharged for disability, 234 by disease and 71 by injury, equivalent to the respective rates of 25.48, 19.55, and 5.93 per thousand of strength. Discharge was caused by venereal diseases in 3.25 per thousand of strength, in 2.59 by heart disease, in 2.51 by consumption, and in 1.17 by gunshot wounds. The death rate from all causes was 19.55, of which 17.29 was caused by disease and 2.26 by injury. Typhoid fever occasioned 63 deaths, equivalent to a rate of 5.26 per thousand men; yellow fever, 50 deaths, equivalent to 4.17 per thousand, and malarial infections, 20 deaths, equivalent to a rate of 1.67.

The volunteers in Cuba during this year, with a mean strength of 8,082, had an admission rate of 2,441.72 per thousand, of which 1,047.64 was occasioned by malarial fevers and 372.93 by diarrheal diseases. One hundred and one men were discharged from service on account of disability, 92 from disease, and 9 from injury, equivalent to the respective rates of 12.50, 11.38, and 1.11 per thousand of strength. Malarial diseases caused the relatively high rate of 5.62; venereal dis-

cases, 1.86; consumption, 1.24, and gunshot wounds, 0.25. The death rate from all causes was 16.46, as compared with 86 during the previous year under the influences of war. Disease caused a death rate of 14.97, and injury 1.48. Only 1 death from yellow fever occurred among the volunteer troops during this year, causing a rate of 0.12 per thousand men. Malarial fevers caused the highest death rate, 3.71; typhoid fever, 2.72, and diarrheal diseases, 2.35.

The mean strength of the regulars in Porto Rico in 1899 was 3,347. In this command the admission rate for disease was 2,352.85, for injury 275.48; total, 2,628.33. Diarrheal diseases contributed 582.91 to the total rate, malarial fevers 467.28, and venereal diseases 295.18. The discharges for disability, 72 in number, were equivalent to a rate of 21.51, venereal diseases contributing 6.27 per thousand men. The death rate was only 11.35 per thousand, of which 2.19 was due to injury and only 9.26 to disease. Diarrheal diseases and typhoid fever were the prominent causes, the former having contributed 2.99 and the latter 2.69 to the rate of mortality.

Among the small number, 380, of volunteers in Porto Rico, the admission rate dropped to 1,589.47 and the death rate to 10.53 per thousand of strength, 2.63 of the latter being due to injury and only 7.89 to disease.

The regulars in the Pacific islands, with a mean strength of 22,922 in 1899, had an admission rate of 2,630.92—2,454.10 from disease and 176.82 from injury, of which 39.05 per thousand of strength was the result of gunshot. Diarrheal diseases and malarial infections constituted more than half of the cases, the former having a rate of 728.17 and the latter 705.49, a very considerable increase on the rates of 1898, respectively 431.97 and 429.56. The death rate also was higher, 31.10 per thousand of strength, of which 17.80 was due to disease and 13.30 to injury, 9.60 of the 13.30 being the result of gunshot. Diarrheal diseases caused the deaths of 5.72 men per thousand of strength, typhoid fever 3.58, malarial infections 1.23, smallpox 1, and pneumonia 0.79.

In this year the volunteers also had a higher rate of admission than in 1898, due to an increased prevalence of diarrheal and malarial diseases. The death rate from all causes was equal to a loss of 29.83 men per thousand of strength during the year, but only 11.80 of this was caused by disease. Injuries were responsible for 18.03 of the admission rate, of which 16.81 resulted from gunshot. The prominent fatal diseases were smallpox, which caused 3.36 deaths per thousand men, diarrheal diseases 3.18, typhoid fever 2.20, pneumonia 1.14, and malarial infections 0.43.

The regulars at the home posts had a mean strength of 26,208 in 1899. The admission rate for this command was 1,772.17 per thousand of strength—1,551.47 for disease and 220.70 for injury; 363.37 of the rate was due to malarial infections, mostly the result of foreign service. The death rate was light, only 6.72 from disease and 1.56 from injury; a total of 8.28 per thousand of strength for the year.

The volunteers at the home posts, with a mean strength of 15,984, had an excellent record, which compares favorably with that of the Regular Army in times of peace. The death rate from all causes was only 7.26 per thousand men, 0.94 due to injury and 6.32 to disease. The chief items constituting this death rate were pneumonia 2.38, typhoid fever 1.19, diarrheal diseases 0.38, and malarial fevers 0.37.

The following tabulation presents many interesting points relating to the mortality among our troops during the past two years:

Annual death rates per thousand of strength among volunteer and regular troops serving in Cuba, Porto Rico, the Philippine Islands, and the United States during the years 1898 and 1899.

Deaths.	Cuba.				Porto Rico.			
	1898.		1899.		1898.		1899.	
	Volunteers.	Regulars.	Volunteers.	Regulars.	Volunteers.	Regulars.	Volunteers.	Regulars.
All causes	86.00	98.16	16.46	19.55	52.09	41.45	10.53	11.35
All injuries	12.35	37.01	1.48	2.26	2.66	2.07	2.63	2.09
Gunshot injuries	11.91	33.33	.62	.92	1.86	1.04	.....	.60
All diseases	73.65	61.15	14.97	17.29	49.43	39.38	7.89	9.26
Typhoid fever	22.05	14.17	2.72	5.26	40.66	22.80	2.63	2.69
Yellow fever	15.88	17.57	.12	4.17	.....	.....	.....	.....
Smallpox	.....	.....	.25	.08	.27	.52	.....	.....
Malarial fevers	14.77	13.12	3.71	1.67	2.92	5.70	.....	.....
Diarrheal diseases	8.60	9.97	2.35	.83	1.06	2.07	.....	2.99
Pneumonia	.66	.26	1.36	.75	.27	.52	.....	.30

Deaths.	Philippine Islands.				United States.			
	1898.		1899.		1898.		1899.	
	Volunteers.	Regulars.	Volunteers.	Regulars.	Volunteers.	Regulars.	Volunteers.	Regulars.
All causes	24.70	22.74	29.83	31.10	24.41	20.14	7.26	8.28
All injuries	3.43	4.13	18.03	13.30	1.11	2.69	.94	1.56
Gunshot injuries	2.86	3.10	16.81	9.60	.43	1.21	.62	.57
All diseases	21.27	18.60	11.80	17.80	23.29	17.45	6.32	6.72
Typhoid fever	9.28	7.58	2.20	3.58	16.59	8.79	1.19	.99
Yellow fever	.....	.....	.....	.....	.01	.08	.....	.11
Smallpox	2.14	2.07	3.36	1.00	.....	.....	.12	.04
Malarial fevers	1.43	1.72	.43	1.23	1.26	2.24	.37	.12
Diarrheal diseases	2.86	1.72	3.00	5.72	.60	1.39	.38	.04
Pneumonia	1.14	.69	.06	.79	1.00	.92	2.38	.80

Relative prevalence of disease among white and colored troops.—During the past two years the rates of admission to sick report and of discharge for disability were practically the same among the white and the colored troops. The death rates from all causes were, however, somewhat lower among the latter, notwithstanding a loss of 5.13 per thousand of strength from injury in 1898, as against 2.91 among the white troops.

Although the admission rates were practically the same for both races, some differences may be observed in the items which make up the totals. Thus the colored troops had relatively fewer cases of measles, mumps, smallpox, diphtheria, cerebro-spinal fever, typhoid fever (see page 224), and alcoholism, with considerably less of diarrheal diseases, than the white troops. For alcoholism the rates of admission were only 2.94 and 5.65 in 1898 and 1899 among the colored troops, as compared with 8.95 and 15.11 among the white troops. For diarrheal diseases the rates of the colored troops during these two years were 168.11 and 164.96, as compared with 400.24 and 395.99 among the whites. On the other hand, the negro troops slightly exceeded the white troops in their admission rates for yellow fever, malarial fevers, erysipelas, rheumatic fever, consumption (see page 274), diseases of the respiratory organs, and very considerably in their rates for venereal diseases. Among the colored troops in Cuba in 1898 there were 232 cases of yellow fever, with 36 deaths, giving the respective rates

of 146.19 and 22.68 per thousand of strength, while the corresponding rates for the white troops serving in Cuba at the same time were 132.58 and 15.24. It is to be noted, however, that the unusual prevalence of this disease among the colored troops was due to special influences affecting one regiment, the Twenty-fourth United States Infantry. One hundred and sixty-seven of the cases and 23 of the deaths occurred in this regiment, concerning which Col. Charles R. Greenleaf, assistant surgeon-general, United States Army, reported, August 24, 1898:

I was much embarrassed in taking care of the sick by the lack of nurses and proper guards, and applied twice to the general commanding the Fifth Army Corps for troops to perform this duty, but he declined to furnish them. On my appeal to General Miles, however, he promptly ordered the whole of the Twenty-fourth Infantry to report to me for duty. This regiment made a night march, arriving at Siboney early the next morning. The necessity for aid was so urgent that I requested the commanding officer to call for volunteers from that regiment to serve in the yellow fever hospitals. This request brought forth a prompt response, more that twice the number of men required volunteering for this perilous duty. I desire to bring to the notice of the General Commanding the Army the conduct of these men. The cheerfulness with which they did their duty under the most adverse circumstances, and the promptness with which they volunteered for any service with the sick deserves, in my opinion, a special commendation.

An excess of malarial infections among the colored troops is observed in the statistics for the years 1898 and 1899, when the rates for the white and the colored troops of the whole Army are compared. The admissions for the white troops were equal to an annual rate of 591.44, and for the colored troops to a rate of 675.77, per thousand men of each race. This, however, does not imply a greater susceptibility on the part of the colored men, but is referable to the fact that during a part of the time all the colored regiments were exposed to Cuban malaria, while only a relatively small proportion of the large force of white troops was similarly exposed. To ascertain relative susceptibility of the two races we must compare the rates of troops operating in the same malarious localities. In 1898 the admission rate for malarial diseases of the Regular Army in Cuba, including two infantry and two cavalry regiments of colored troops, was 1,174.94 per thousand of strength, but the rate of the colored regiments was only 768.53.

Venereal diseases in 1898 caused 149.58 admissions per thousand of strength among the colored men, and in 1899 195.92, as against 78.48 and 128.59 among the white troops during these years.

Seasonal prevalence of disease.—With a mean monthly admission rate of 165.46 for all diseases in 1899, the seasonal curve for the Army as a whole began in January with the high rate of 178.04 per thousand of strength. It fell in February and March, and in April reached a minimum of 140.54. During the next four months the rate rose to the maximum of the year, 179.78, in August. In September the rate fell below the mean, but rose to about the level of the latter during the last three months of the year. There is little to be learned from a study of this curve of prevalence, for the climatic and other influences which affected it were too complex to be considered from this point of view.

Even when we compare the prevalence of disease among troops in the United States in 1899 with the recorded prevalence in former years, differences are found which are evidently not due to climatic conditions in this country, but to previous service of the troops in other climates.

During the decade 1888–1897 the monthly admission rate was usually high in January from influenza and bronchitic attacks. From this point it fell to a minimum in April, after which it rose, slowly during May and June, and rapidly in July and August, to the maximum of the year. It remained high in September, but fell again during the last three months of the annual period. The wave of prevalence during the months of July, August, and September was due to malarial diseases. Prior to the decade mentioned this autumnal wave was larger than in recent years, and there was frequently a slight prominence in the curve in May or June, corresponding with a sudden increase of cases of intermittent fever. During the past year the curve of prevalence of disease among United States troops in garrison in the United States changed considerably from the characteristic curve of former years. The mean monthly rate of admission was 124.73, due to large rates in January, February, and March; the maximum in January, 180.61. The rates of all the other months were below the mean, the lowest having occurred in July and December, 80.84 and 80.38. The large rates of the first three months of the year were caused in part by diseases of the respiratory organs, and very considerably by recurrences of malarial affections contracted in Cuba and Porto Rico during the year 1898. The death rate was above the mean monthly rate of the year during the first five months and below the mean during the remaining months. The larger death rates of the earlier months were due to pneumonia and typhoid fever.

The following table shows the prominence of certain diseases among the troops stationed in the United States in 1899. Similar tables relating to troops in the Philippines, Cuba, and Porto Rico will be found on pages 87, 167, and 187.

Diseases.	January.				February.				March.			
	Cases.		Deaths.		Cases.		Deaths.		Cases.		Deaths.	
	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.
Typhoid fever	82	0.91	12	0.13	19	0.33	3	0.05	21	0.44	1	0.02
Malarial infections	3,161	35.05	1	.01	1,721	29.94	1	.02	1,412	29.61	1	.02
Undetermined fevers	60	.67			38	.66			19	.40		
Rheumatic affections	683	7.57			374	6.51			269	5.64	1	.02
Consumption	17	.19	4	.04	16	.28	1	.02	12	.25		
All venereal diseases	1,078	11.95			620	10.78			502	10.53		
Alcoholism and direct results	97	1.08	3	.03	72	1.25	1	.02	44	.92		
Diarrheal diseases	497	5.51			232	4.04			245	5.14	1	.02
Pneumonia	112	1.24	17	.19	73	1.27	13	.23	70	1.47	17	.36
Total respiratory	2,866	31.78	17	.19	1,577	27.43	13	.23	1,208	25.33	17	.36
All diseases	16,286	180.61	65	.72	8,605	149.69	39	.68	7,245	151.90	34	.71

Diseases.	April.				May.				June.			
	Cases.		Deaths.		Cases.		Deaths.		Cases.		Deaths.	
	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.
Typhoid fever	34	0.71	7	0.15	31	1.04	5	0.15	27	1.05	1	0.04
Malarial infections	1,311	27.47	3	.06	898	27.58			410	16.00		
Undetermined fevers	47	.98			21	.64			18	.70		
Rheumatic affections	208	4.36			201	6.17			155	6.05		
Consumption	6	.13	2	.04	11	.34	4	.12	7	.27		
All venereal diseases	447	9.37			359	11.03			333	13.00		
Alcoholism and direct results	43	.90	4	.08	43	1.32	1	.03	36	1.41		
Diarrheal diseases	378	7.92			307	9.43			310	12.10		
Pneumonia	39	.82	5	.10	14	.43	2	.06	7	.27		
Total respiratory	719	15.07	6	.13	373	11.46	2	.06	176	6.87		
All diseases	5,358	112.26	38	.80	3,837	117.84	25	.77	2,676	104.44	10	.39

Diseases.	July.				August.				September.			
	Cases.		Deaths.		Cases.		Deaths.		Cases.		Deaths.	
	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.
Typhoid fever	39	1.19	1	0.03	41	1.09	2	0.05	111	2.49	5	0.11
Malarial infections	414	12.59			984	26.25			980	21.94	3	.07
Undetermined fevers	22	.67			44	1.17			34	.76		
Rheumatic affections	106	3.22			162	4.32			171	3.83		
Consumption	15	.46	2	.06	7	.19			12	.27	1	.02
All venereal diseases	328	9.97			375	10			329	7.37		
Alcoholism and direct results	31	.94			32	.85			51	1.14		
Diarrheal diseases	459	13.96	1	.03	700	18.68			456	10.21	2	.04
Pneumonia	16	.49	1	.03	10	.27	1	.03	11	.25		
Total respiratory	151	4.59	1	.03	213	5.68	1	.03	253	5.66	2	.04
All diseases	2,658	80.84	12	.36	4,178	111.46	5	.13	3,922	87.81	16	.36

Diseases.	October.				November.				December.			
	Cases.		Deaths.		Cases.		Deaths.		Cases.		Deaths.	
	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.
Typhoid fever	29	0.73	5	0.13	15	0.52	1	0.03	6	0.28	2	0.09
Malarial infections	561	14.19			279	9.59			142	6.64		
Undetermined fevers	30	.76			13	.45			6	.28		
Rheumatic affections	256	6.47			182	6.26			150	7.01		
Consumption	16	.40	1	.03	13	.45			2	.09		
All venereal diseases	420	10.62			344	11.83			238	11.13		
Alcoholism and direct results	28	.71	1	.03	58	1.99			33	1.54	2	.09
Diarrheal diseases	271	6.85	2	.05	106	3.64			66	3.09	1	.05
Pneumonia	22	.56	2	.05	18	.62	1	.03	9	.42		
Total respiratory	394	9.96	2	.05	366	12.59	1	.03	241	11.27		
All diseases	3,783	95.66	14	.35	2,888	99.30	8	.28	1,719	80.38	11	.51

CAMPS OF UNITED STATES VOLUNTEER REGIMENTS IN THE UNITED STATES.

In preparing the camps in which the United States volunteer regiments were organized the utmost care was taken to provide for the comfort and well-being of the men. The tentage consisted, generally, of conical wall tents, with an average of 8 men to a tent. The streets were wide and the tents along each side were placed at the width of a tent apart. All the tents were floored, the flooring well raised from the ground. Special latrines were provided, the contents of which were regularly flushed into a sewerage system or emptied by an odorless excavator. Policing was done by civilian labor. Water supplies were furnished from good sources and delivered by faucet in convenient places. Bath houses, with hot and cold water, gave the needful facilities for personal cleanliness. The kitchens and mess rooms were carefully supervised and the general sanitary conditions were excellent. I submit in this place two reports, one showing the condition of the Thirty-Fifth, the other of the Forty-Fifth United States Volunteer Infantry.

REPORT ON THE SANITARY CONDITION OF THE THIRTY-FIFTH UNITED STATES INFANTRY VOLUNTEERS, AT VANCOUVER BARRACKS, WASH., AUGUST 31, 1899, BY MAJ. R. G. EBERT, SURGEON, UNITED STATES ARMY.

The camp as now occupied was partially planned for the muster out of the Second Oregon. The tentage and grounds of the First Battalion and the field hospital in the post hospital inclosure were erected for that purpose. The various camp sites are on a gentle southern slope, with a fall of about 4 feet per 100, soil gravelly, covered with natural sod, readily absorbing moisture, and, with the exception of the neighborhood of the latrines of the Second Battalion, well drained, as proved by

recent storms. Camp of Third Battalion is entirely in the open; of Second adjoining a small grove of locusts and some scattering maples; of First in the open ground. Tentage is all floored and raised above the ground. Second and Third battalions are in Sibleys, with 8 or 9 men in a tent; First Battalion in A wall tents, 3 men to a tent. Bedsacks and straw are furnished. At present no means of heating is provided, though floors are arranged for Sibley stoves in the conical wall tents.

The kitchens are beneath open sheds, 12 by 12 feet, and have complete field outfits; mess sheds, 60 by 20 feet, at opposite end of street to latrines. Ample tables and benches are provided for each organization. Water at each kitchen, the hydrant being under absolute control of cook, by removal of handle of faucet and placing it in his charge to prevent unauthorized use and consequent muddiness of ground; drippings caught in buckets. Meat safes, 48 by 36 by 30 inches, with screened sides and doors, located above ground, have been furnished, to prevent contamination of food by flies and to allow free access of air. Kitchen refuse, when not burned, is placed in a covered receptacle, which is emptied twice daily, or oftener if necessary; barrels scalded at each emptying and washed with hydrate of lime; attention is also given to the cleanliness of lids and the outer surface of barrels. All refuse of kitchen is removed in closed sanitary carts and dumped in the deep water of the Columbia River. Thorough cleanliness of all surroundings of kitchen and camp is constantly dwelt upon, and when ground is accidentally soiled by spilling of dishwater it is immediately covered with fresh earth or ashes.

Each company of the Second and Third battalions has latrines 10 by 20 feet, accommodating 14 persons. This consists of two zinc-lined troughs, 14 feet by 25 by 17 inches, with a fall of 4 inches, to assure free flushing. Water is admitted at upper end by faucet, while the escape into sewer, properly trapped, is by "Demorest valve." Both entrance and outflow are under control of civilian employees, being guarded by lock and key to prevent unauthorized meddling. The troughs are emptied twice daily, the water standing at least 3 inches deep in the shallowest places, mixed with hydrate of lime, and this is stirred at frequent intervals (paddles or brooms kept in a solution of lime). Toilet paper only is allowed to be used, and is supplied freely by the Quartermaster's Department. Urinals, constantly flushed with water and properly "limed," are connected direct with sewer, with due precaution as to trapping. Sewer ventilation is by standpipe, extending above each latrine.

The First Battalion has but two latrines, one for each two companies; these having been constructed earlier, have smaller troughs, but are similar in sanitary arrangement. Urine tubs, two to each company, provided with hydrate of lime, are placed in streets at tattoo and removed and cleaned at reveille. The commanding officer of the regiment has been requested to give necessary orders for their proper use.

On the outer wall of each latrine a zinc-lined trough 20 feet by 18 by 4 inches, water supplied by four faucets, serves for lavatory purposes. Three companies of the First Battalion have lavatory at different places than latrines, but all are connected with sewer. The latrines and police of grounds are attended to by civilian employees of the Quartermaster's Department. One caldron of 75 gallons' capacity is furnished each battalion for laundry purposes. The bath room is a model, and a permanent addition to the post. The building is well constructed and is 23 by 40 feet, with annex 16 by 25 feet for steam tubular boiler of 40-horsepower capacity (size of boiler, 44 inches in diameter and 10 feet long). The system is the "Gegenstrom." On a concrete floor, sloping to a central drain properly trapped and connected with sewer, are erected 48 closets, each 3 by 4 feet, 12 each on north and south wall directly facing similar ones in the center of the building. Those in the center are for bathing, and those on the outer wall for dressing. Shower baths, temperature from 52 to 115 degrees, can be given to either 4 or 24 men at one time. The regulation of temperature and the flow of water is in the hands of a civilian attendant, a thermometer showing the absolute degree of heat. Allowing four minutes each for undressing and dressing, and six minutes for bathing, the capacity of the house is 96 men per hour. Baths are now ordered at from 93 to 95 degrees, finishing with a final dash of cold water. The house is open from 8 a. m. to 5 p. m. All closets being on iron supports 6 inches above the ground, thorough cleanliness is assured. Steam radiators will be necessary in the winter. Ventilation is properly provided.

The food supply is that authorized by regulations, and is of good quality. The post bakery is furnishing bread, but its capacity is hardly equal to the demand, and in the rapid baking the bread has not always been the best. Field ovens should be established, or if a permanent increase in the strength of the command to present proportions is contemplated, then an addition to the present plant should be made. The cooking, as a rule, is satisfactory. Some of the recruits stated that food was insufficient; this complaint is probably based on the fact that the exercise of drill has

caused a more healthy assimilation in the sluggish, and possibly some temporary lack of experienced management while companies were being organized may have been in operation. Frequent inspections have shown but few instances where this complaint was justified, and never in an organized company. Attention has been invited to restricting men in the indulgence of unripe fruit, and the sick report has been materially increased by the nonobservance of this matter.

The water supply of this post can be brought to 320,000 gallons per day. Former analyses show it almost absolutely pure, and for the present strength of command it is more than ample.

The clothing issued is not entirely satisfactory. Leggings are of poor material and workmanship; complaint has been made of the eyelet pulling out and the straps breaking. Shoes, both black and russet, are too low in the instep for many individuals. Socks are said to be of inferior quality. Some complaint has been made of the blouses, both in regard to quality and workmanship. To recruits just joining there should be an issue of towels, as without them and with no money to buy, it seems that cleanliness must suffer. The khaki is said to be of good quality; the same can be said of underclothing and blankets.

Habits of the men seem to differ as to the locality from which they were recruited. As a rule, the men from the Western States are a more desirable class. Under the constant drill and discipline imposed by the commander of the Thirty-fifth Infantry, there is a daily improvement not only in the soldierly appearance, but in the moral tone.

Besides the Thirty-fifth Infanty, there are at this post 538 volunteer recruits. These are quartered in barracks and organized into casual companies. The number of men assigned to each building is in excess of that for which the building was intended, and to remove any possible bad effect of overcrowding, it has been recommended that all upper sashes of windows be lowered at least 4 inches, to insure an abundance of fresh air. As soon as these recruits are received at post they are bathed, but owing to an insufficient supply of clothing—it having been expected that but 1,309 men would be sent here—these men are waiting for uniforms, for which telegraphic requisitions have been duly made.

The sanitary condition of the post is shown as follows: Regulars present, 132; sick, 0. Volunteers present, 1,859; sick, 27. Of these 27 cases 7 are injuries, 4 venereal diseases, 6 malarial diseases, and 10 miscellaneous.

Sanitary Condition of the Camp of the Forty-Fifth United States Infantry Volunteers, at Fort Snelling, Minn., September 27, 1899, reported by Lieut. Col. H. R. Tilton, Chief Surgeon, Department of Dakota.

The camp is well located on a high plateau, and extends in a northeast and southwest direction. The surface covered by the companies and band measures 172 feet by 988 feet. The entire camp, including regimental headquarters, battalion officers' tents, companies, and latrines, occupies a surface of not quite 10 acres. The tentage provided has been most liberal; 14 conical wall tents for each company allows 1 conical tent for 8 men, besides giving a first sergeant a separate tent. The tents have all been provided with floors, and arrangements are being made for heating stoves. Water from the Fort Snelling waterworks has been piped to each company, one faucet being at the company kitchen, the other near the latrines. The latrines have only been in use a short time, and, so far as I observed, they admirably serve the purpose. One difficulty is the supply of toilet paper. For the satisfactory working of the latrines, newspapers and the coarser kinds of paper which float above the surface are objectionable. So soon as a company can provide a fund by saving on surplus rations and profit of the canteen, such necessary articles can be purchased out of the company fund. When a regiment is organizing, with no fund available, some provision ought to be made to bridge over the period intervening until a fund can be made. Now the Subsistence Department is authorized to provide toilet paper for prisoners, but for no other portion of the command. A bath house has been constructed with capacity for 24 shower baths. The boiler has not yet arrived, and until it is put up the men have no facilities for bathing nearer than the barrack bathrooms. A place for washing faces and hands in connection with the bathing arrangements would add much to the comfort of the men, and in this connection hot water should be provided for washing the individual mess kits after each meal. This is usually provided by means of a camp kettle over a pit and open fire, but this requires turning up the soil, and the design in the present camp is to avoid digging up the soil as much as possible.

The company kitchens, as well as the hospital and band, have been provided with the Donavin-Myers field range. This is made of sheet steel with cast-iron top, and

measures 21 by 21 by 39 inches, and is a most convenient and economical method for use in the field, although such a range could not be carried with a pack train, while the Buzzacott cooking oven and stove is more portable. I saw the cooking arrangements and the serving of dinner, which was well prepared. The bacon was excellent. The garbage is received in galvanized iron barrels, and contents removed twice daily. The contents of the latrines are removed once daily by means of an odorless excavator. This work is done by a contractor. A galvanized-iron barrel is to be placed in each company street for use as a urinal at night, and removed each morning.

The hospital has the full allowance of tents, and floors were being brought into camp for the hospital, and stoves were also to be put up. Only two mild cases of disease were in the hospital, which is provided with 10 cots. One was a case of intermittent fever and one a case of sore throat. The hospital has its complete outfit of medical and surgical appliances. Two thousand first-aid packages have been called for, and authority has been given to purchase the necessary quicklime and crude carbolic acid for use in all the latrines in camp. The regiment has its authorized 3 hospital stewards and 8 hospital corps privates; 4 more privates will be required to complete the full allowance. All the men in the command have been vaccinated.

The only criticism I have to make as to the arrangement of the camp is that, in my opinion, where the ground will permit, at least 20 acres should be occupied by a regiment of 1,200 men.

DIVISION OF THE PHILIPPINES

HEALTH OF THE TROOPS.

In the Philippine Islands, in 1898, with a mean strength of 9,907 regulars and volunteers, the admission rate for all causes of disability was 1901.99 per thousand of strength; for disease, 1776.72; for injury, 125.26; for gunshot injury, 13.02. The death rates corresponding to these admission rates were respectively 24.12, 20.49, 3.63, and 2.93. Malarial fevers contributed the largest proportion, 424.55, to the admission rate, but only 1.51 to the death rate. Typhoid fever, though forming only 83.77 of the admission rate, caused 8.78 of the 20.49 deaths from disease per thousand of strength, the cases numbering 830 and the deaths 87. Diarrheal diseases gave an admission rate of 399.60, with a death rate of 2.52 per thousand men. The number of cases was 3,959 and deaths 25. Seventy-five cases of smallpox, of which 21 were fatal, gave rates, respectively, of 7.57 and 2.12 per thousand of strength.

In 1899, with a mean strength of 39,280 regulars and volunteers, the admission rate for all causes of disability was 2395.52 per thousand of strength; for disease, 2206.36; for injury, 189.16; for gunshot injury, 52.26. The death rates corresponding to these admission rates were, respectively, 30.58, 15.28, and 12.60. Although the admissions for disease were considerably increased during this year, 2206.36 per thousand men as compared with 1776.72 in 1898, and although the death rate from all causes 30.58 as compared with 24.12 in 1898, the death rate from disease became reduced from 20.49 to 15.30 per thousand men. The increased admission rate was due to diarrheal diseases, malarial infections, and injuries. Diarrheal diseases formed 642.80 and malarial infections 624.37 of the total admission rate. The lessened rate of mortality from disease resulted from a lessened prevalence of typhoid fever, with a consequent lowering of the death rate from that disease. Eight hundred and sixty-two cases of this fever, of which 118 were fatal, gave an admission rate of 21.95 and a death rate of 3 per thousand of strength. The lower death rate was

also in part due to the milder character of the malarial infections, the death rate from these diseases being only 0.89 as compared with 1.51 in 1898. These influences lowered the death rate from disease, notwithstanding a very material increase in the malignity of the diarrheal diseases, which gave a death rate of 4.58 per thousand men as compared with 2.52 during 1898. The increase in the totality of the death rate was the consequence of active service as expressed by the mortality rate for gunshot injury, 12.60 per thousand of strength as compared with 2.93 during the previous year. Two hundred and sixty-seven cases of smallpox, 78 of which were fatal, gave rates, respectively, of 6.80 and 1.99 per thousand of strength.

Seasonal prevalence of disease. – In the Philippine Islands in 1899 the mean monthly rate of admission for disease was 183.86. In January the rate was considerably below this mean. The minimum, 93.08, was reached in February, after which the rates rose slowly in March and April and rapidly in May and June until the maximum, 223.56, was reached in July. The rates fell slowly during the remaining months of the year. The rapid increase from May to July was due partly to malarial infections, but chiefly to diarrheal diseases. Lessened prevalence of the latter during the later months lowered the rate of admission, notwithstanding continued high rates for malarial infections. But it can not be inferred from these records that the first four months of the year constitute the healthy season, while the second four are characterized by a maximum prevalence of diarrheal diseases, and the last four by a maximum prevalence of malarial fevers, because among the unsanitary influences affecting the troops during this year were those of active and exhausting field service, which certainly exercised a considerable modifying effect on those of climate and season.

The mean monthly death rate from disease was 1.28 per 1,000 of strength. The rate was considerably below this during March, April, May, and June. In July and December the rates differed but little from the mean. During the other months they were higher than the mean, that for September, 1.84, being the highest; and all may be said to have been due to the increased fatality of diarrheal diseases. The following table shows the prevalence of certain diseases by months in these islands:

Seasonal prevalence of disease among troops in the Philippine Islands during the calendar year 1899.

Diseases.	January.				February.				March.			
	Cases.		Deaths.		Cases.		Deaths.		Cases.		Deaths.	
	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.
Typhoid fever	44	1.93	6	0.26	24	0.84	5	0.17	34	1.14	5	0.17
Malarial infections	572	25.05	.....	.....	591	20.60	.....	.....	955	32	.....	.....
Undetermined fevers	70	3.07	.....	.....	48	1.67	.....	.....	55	1.84	.....	.....
Rheumatic affections	148	6.48	.....	.....	141	4.92	.....	.....	259	8.68	.....	.....
Consumption	8	.35	.....	.....	2	.07	1	.03	11	.37	1	.03
All venereal diseases	302	13.23	.....	.....	283	9.87	.....	.....	313	10.49	.....	.....
Alcoholism and direct results	18	.79	.....	.....	3	.10	.....	.....	17	.57	.....	.....
Diarrheal diseases	468	20.50	.....	.....	477	16.63	6	.21	896	30.02	5	.17
Pneumonia	6	.26	.....	.....	12	.42	1	.03	3	.10	3	.10
Total respiratory	125	5.47	.....	.....	213	7.43	1	.03	229	7.67	3	.10
All diseases	2,793	122.32	31	1.36	2,670	93.08	40	1.39	3,975	133.19	29	.97

Seasonable prevalence of disease among troops in the Philippine Islands during the calendar year 1899—Continued.

Diseases.	April.				May.				June.			
	Cases.		Deaths.		Cases.		Deaths.		Cases.		Deaths.	
	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.
Typhoid fever	50	1.56	2	0.06	75	2.09	12	0.33	142	3.70	11	0.29
Malarial infections	922	28.85	1	.03	1,223	34.12	2	.06	1,223	31.90	....	.....
Undetermined fevers	59	1.85	....	.....	75	2.09	....	.....	73	1.90	....	.....
Rheumatic affections	256	8.01	....	.....	227	6.33	....	.....	238	6.21	....	.....
Consumption	12	.38	2	.06	16	.45	....	.....	20	.52	2	.05
All venereal diseases	349	10.92	....	.....	369	10.29	....	.....	337	8.79	....	.....
Alcoholism and direct results	14	.42	....	.....	21	.59	2	.06	10	.26	....	.....
Diarrheal diseases	1,280	40.05	4	.13	3,068	85.58	6	.17	3,731	97.32	6	.16
Pneumonia	9	.28	1	.03	13	.36	....	.....	8	.21	2	.05
Total respiratory	165	5.16	1	.03	166	4.63	....	.....	209	5.45	2	.05
All diseases	4,322	135.23	22	.69	6,986	194.87	33	.92	7,700	200.85	30	.78

Diseases.	July.				August.				September.			
	Cases.		Deaths.		Cases.		Deaths.		Cases.		Deaths.	
	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.
Typhoid fever	81	2.03	15	0.38	78	2.01	15	0.39	94	2.40	13	0.33
Malarial infections	1,602	40.20	4	.10	2,044	52.59	1	.03	2,150	54.92	3	.08
Undetermined fevers	87	2.18	....	.....	118	3.04	....	.....	193	4.93	....	.....
Rheumatic affections	250	6.27	....	.....	287	7.38	....	.....	215	5.49	1	.03
Consumption	14	.35	2	.05	22	.57	5	.13	17	.43	5	.13
All venereal diseases	301	7.55	....	.....	356	9.16	....	.....	353	9.02	....	.....
Alcoholism and direct results	19	.48	1	.03	13	.33	1	.03	34	.87	1	.03
Diarrheal diseases	4,282	107.44	16	.40	3,086	79.39	15	.39	2,134	54.51	26	.66
Pneumonia	15	.38	1	.03	15	.39	2	.05	11	.28	6	.15
Total respiratory	253	6.35	1	.03	173	4.45	3	.33	203	5.19	8	.20
All diseases	8,910	223.56	49	1.23	8,466	217.80	59	1.52	7,981	203.87	72	1.84

Diseases.	October.				November.				December.			
	Cases.		Deaths.		Cases.		Deaths.		Cases.		Deaths.	
	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.
Typhoid fever	79	1.64	10	0.21	78	1.42	7	0.13	83	1.32	17	0.27
Malarial infections	3,345	69.44	5	.10	4,641	84.69	6	.11	5,257	83.44	13	.21
Undetermined fevers	176	3.65	....	.....	321	5.86	....	.....	180	2.86	....	.....
Rheumatic affections	191	3.97	....	.....	226	4.12	1	.02	225	3.57	....	.....
Consumption	16	.33	6	.12	16	.29	5	.09	22	.35	2	.03
All venereal diseases	407	8.45	....	.....	546	9.96	....	.....	671	10.65	....	.....
Alcoholism and direct results	29	.60	....	.....	32	.58	....	.....	37	.59	3	.05
Diarrheal diseases	2,140	44.43	31	.64	1,868	34.09	34	.62	1,819	28.89	31	.49
Pneumonia	19	.39	2	.04	6	.11	....	.....	20	.32	1	.02
Total respiratory	225	4.67	3	.06	228	4.16	1	.02	353	5.60	2	.03
All diseases	9,955	206.67	69	1.43	10,878	198.50	70	1.28	12,030	190.95	97	1.54

Medical officers in the Philippines, as elsewhere, have been earnest in their recommendations for the welfare of the men, and commanding officers have usually acted promptly, so far as lay in their power, to carry the recommendations into effect. It has been difficult, however, and, indeed, impracticable to control many of the insanitary conditions, particularly during the progress of the campaign against the insurgents. In many localities the ground was saturated with water, and drainage impossible. Efforts have been made to prevent the troops from frequenting the houses of low-class natives, where infectious diseases are exceedingly common. Special attention has been given to the quarters of the men and to the care of the sinks and earth closets, to the purification of the drinking water, to the supply and prepara-

tion of food, the supervision of the laundry work, and the installation of shower baths where there were no other facilities for bathing.

The exposures, fatigues, and excitements of a prolonged campaign are responsible for the large sick report and the relatively large death rate among the troops in the Philippines. The difference is said to have been startling between the sick rate of regiments at the front doing constant outpost duty, subject to night attacks, and having to make periodical advances through difficult country, and that of regiments doing garrison duty at towns in the rear. This difference has been manifested even where the permanent stations have been in insanitary localities. A battalion at Candaba, a badly drained town with insanitary surroundings, had a sick rate of only 8 per cent, while at the same time troops at Angeles, a well-drained town with a sandy soil, gave a rate of 25 per cent. The troops at Candaba had been on ordinary garrison duty for some time, while those at Angeles had fought their way from San Fernando by successive attacks.

Indeed, the opinion is prevalent among our medical officers that in time of peace and doing only garrison duty the sick rate of the Army in the Philippine Islands would be no higher than it ordinarily is in the Southern United States.

The latest reports received from the chief surgeon, Division of the Philippines, dated August 15, 1900, show a percentage of 8.47 sick for the command, which on that date had a strength of 60,554. There were:

Sick in quarters	1,261
Sick in regimental hospitals	1,119
Sick in military hospitals in departments	1,241
Sick in Manila hospitals	1,508
Total sick	5,129

The general character of the diseases affecting the troops may be gathered from the following statement, consolidated from the reports of the military and Manila hospitals for August 11, 1900, including a total of 2,807 cases:

Diseases.	Number of cases.	Percentage of total sick.	Diseases.	Number of cases.	Percentage of total sick.
Typhoid fever	56	1.99	Heat exhaustion	5	.17
Malarial fever	605	21.55	Venereal diseases	271	9.65
Dysentery	403	14.35	Measles	5	.17
Diarrhea	463	16.40	Undetermined	99	3.53
Other intestinal diseases	50	1.74	All other diseases	516	18.38
Gastric disorders	96	3.42			
Wounds and injuries	238	8.47	Total	2,807	100

It has been found that in men suffering from dysentery convalescence is slow and recurrences frequent, and that in the event of such recurrences ultimate recovery becomes exceedingly doubtful while the individuals remain in the tropical climate. Rheumatic affections do not improve and the course of consumption is rapidly progressive, according to the experience of medical officers on duty in the large hospitals in Manila. These cases have, therefore, been sent with advantage to the United States for treatment in the general hospital, Presidio of San Francisco, Cal.; the army and navy general hospital at Hot Springs, Ark., and the general hospital for consumption at Fort Bayard, N. Mex.

There are no doubt locations in the Philippines where such cases could be treated with favorable results, but our medical officers have not yet had a sufficient experience of the sanitary conditions and prevailing diseases of the different sections of the islands to enable them to make recommendations as to the selection of sites for convalescent hospitals in which such cases as are now sent to the United States might rest and recuperate.

Field service of the troops.—In my last annual report I described the broken-down condition of General MacArthur's division on its arrival at San Fernando, in May, 1899, after an exhausting campaign which had lasted continuously since the insurgent outbreak on February 4 of that year. During the following autumn military operations were conducted on a relatively large scale, the regiments being brigaded and organized into two divisions. Campaigns were carried on in Cavite Province, in the Valley of the Rio Grande de Pampango and beyond, and many excursions were made into hostile territory. In Negros and Cebu exhausting marches were made in mountain districts, and in Panay there was a sharp campaign. In the late autumn the northern part of Luzon was occupied. All these movements were associated with great fatigues and hardships.

First aid during this field service was usually limited to the hand litters and the possibilities of the first-aid packets and Hospital Corps and orderly pouches, but as the number of wounded in any one engagement was generally small as compared with the number of troops engaged and the consequent number of medical officers and Hospital Corps men available, every care was given to the individual cases. It may be here stated that a profound impression was made on the more intelligent class of Filipinos by the kindness of our soldiers to their wounded. Several medical officers have commented upon this. Filipino prisoners observed that their wounded, when in our hands, were dressed and cared for as if they belonged to our own Army, and this even when we had to leave them behind on account of the military necessity.

An ambulance company was attached to each division, but the ground was often of such a character as to render wheeled vehicles useless, and many of the wounded had to be carried long distances by hand. In the mountain country of what is now the Second district of the Department of Northern Luzon, where the trails are too rough and the turns too abrupt for the use of any kind of travois, the wounded had to be brought out into the foothills by hand litter. The labor of carrying a loaded litter speedily exhausted our men, so that recourse was had to Chinese litter bearers. These men, accustomed to carrying heavy burdens on their shoulder, proved exceedingly valuable under the supervision of the Hospital Corps. They were reported as being patient, tireless, and brave.

Light field hospitals or dressing stations accompanied the advance of the troops, and the wounded were sent back by ambulance or rail to the brigade hospitals or to the large hospitals in Manila. As the second division progressed northward during its campaign the line of rail was repaired. Cars were subsequently fitted up for hospital purposes, and now a daily hospital-train service has been established.

Favorable reports of the ability and zeal of the Hospital Corps on active service in the Philippines have been received from the medical officers on duty with the expeditionary columns. The sick and wounded have been intelligently, faithfully, and well cared for.

Even as late as January and February, 1900, an active campaign was carried on in southern Luzon. An expeditionary force of six regiments of infantry and two of cavalry was mobilized and divided into an advance column under Brigadier-General Schwan, and a marching column under Brigadier-General Wheaton. The brigade surgeon of the one was Maj. H. S. T. Harris, surgeon, United States Volunteers, of the other Maj. H. P. Birmingham, surgeon, United States Army. Another expedition was sent out later under Maj. Gen. James M. Bell for the suppression of insurrectionary movements in the Camarines. Maj. Thomas U. Raymond, surgeon, Fortieth Infantry Volunteers, was brigade surgeon of this command. The difficulties of caring for sick and wounded men on such campaigns may be gathered from the following reports:

REPORT OF MAJ. H. S. T. HARRIS, BRIGADE SURGEON, UNITED STATES VOLUNTEERS, CHIEF SURGEON SECOND DIVISION, EIGHTH ARMY CORPS, BAUTISTA, P. I., DECEMBER 31, 1899.

I have the honor to submit the following report covering the period of my service in charge of this office:

When I reported for duty the headquarters were at San Fernando, and the front of the division occupied the following points, viz: Ninth and Thirty-sixth Infantry on the line from Bacalor to Guagua and the Twelfth and Seventeenth Infantry at Calulut and Sindalan. The sick were brought in from the Bacalor line by ambulances and from Calulut by railway transportation.

The ambulances were found to be insufficient in number and worn out from long and hard use. Constant effort has been made to obtain new vehicles and increase the train. My recommendations in this respect have been carried out as far as it was in the power of the Quartermaster's Department to do it.

The division field hospital, at that time at San Fernando, was taken charge of by First Lieut. P. C. Fauntleroy, assistant surgeon, United States Army, on August 20, 1899, and by his efforts has been kept in most excellent condition, and has met the heavy demands upon it in a most creditable manner.

The headquarters accompanied the advance to Angeles by way of Porac, September 28, 1899. The men wounded in taking Porac, 6 in number, were attended surgically by Maj. P. F. Straub, surgeon, Thirty-sixth United States Volunteer Infantry, and First Lieut. E. W. Pinkham, assistant surgeon, United States Army, surgeon Ninth United States Infantry, and were carried into Angeles with the column, after a night's rest at Porac, without any untoward results.

The division field hospital was moved to Angeles in the first days of October, and very advantageously located in the cathedral at that place, where it now is.

In the advance of Major O'Brien's battalion of the Seventeenth United States Infantry from Calulut to Magallang, November 7, 1899, provision was made for carriage by native bearers of the wounded along with the command, as the condition of the roads precluded the use of ambulances. Opportunity was found, however, to send in the 2 men seriously wounded at Angeles by bull-cart transportation. Acting Asst. Surg. R. A. Edmonston, United States Army, assistant surgeon Seventeenth United States Infantry, was slightly wounded while performing his duties under fire on this march. Hospital Steward George D. Douglass, Hospital Corps, United States Army, was seriously wounded while accompanying the other two battalions of the regiment from Angeles to Magallang on the same movement.

In the advance from Angeles to this place (Bautista), commencing November 9, 1899, the problem presented to the medical department has been quite difficult, owing to the fact that the final movement had to be organized from Mabalacat, 6 miles distant from the base, on short notice, and that the roads from Bamban on proved almost impassable. With the hearty cooperation of the medical-supply depot, the regimental surgeons, and the division quartermaster and commissary officers the task was accomplished without any more than the usual unavoidable amount of discomfort and privation to sick and wounded in the field. The number of wounded was fortunately in no measure what had been anticipated and provided for.

A temporary field hospital was established at Mabalacat for the reception of the wounded during the attack on Bamban November 11, 1899, and was moved to the latter place the next day, but owing to the condition of the roads it was left there temporarily. The sick of the regiments were satisfactorily cared for by their own

medical officers at Capas and Murcia; but at Tarlac the personnel and supplies were brought up by rail and the hospital established in the church, under the very efficient charge of Acting Asst. Surg. J. S. White, United States Army. In order to entitle this hospital to the benefits of General Orders 137, Adjutant-General's Office, current series, it was, at my request, designated in orders from headquarters First Brigade, Second Division, Eighth Corps, as the First Brigade field hospital, although at that time taking care of the sick of all regiments at the front.

In the advance of the Thirty-sixth Infantry and O'Brien's battalion of the Seventeenth Infantry up the railroad medical supplies were carried by native bearers, as no transportation accompanied the command.

Since the establishment of permanent garrisons on this side of the Tarlac washout the sick have been cared for in the regimental hospitals of the Twelfth and Seventeenth Infantry, at Panique and Bautista, respectively. The Thirty-sixth Infantry has a hospital at Mangataren, but has been directed to send its more serious cases to the hospital of the Seventeenth Infantry, at Bautista. It is proposed to put on a well-equipped hospital car from Dagupan to Angeles and then to abandon the First Brigade field hospital at Tarlac and to cut down these regimental hospitals and have the sick cared for in the division field hospital.

The work of all the medical officers in the division has been so well done that it seems unfair to praise any by name. The Thirty-sixth Infantry, however, has been most active, and its surgeon, Maj. P. F. Straub, has had greater opportunity for exhibiting an intimate knowledge of the field requirements of a regiment and for independent executive work. Of these opportunities he appears to have made the best use possible. Both he and Capt. George W. Mathews, assistant surgeon, Thirty-sixth Infantry, have acquitted themselves gallantly on the many occasions they have been under fire. Capt. C. E. B. Flagg, assistant surgeon, United States Army, surgeon Seventeenth United States Infantry, accompanied the Seventeenth Infantry from Angeles to Magallang, Concepcion, and Capas, dressing the wounded in the many fights "right where they fell," to quote a line officer of the regiment, and doing good aseptic operation work under the most discouraging conditions. First Lieut. E. W. Pinkham, assistant surgeon, United States Army, surgeon Ninth Infantry, was with the firing line of the Ninth Infantry when Porac was taken, on September 28, 1899, and First Lieut. Clyde S. Ford, assistant surgeon, United States Army, at that time surgeon Twelfth Infantry, was at the front with the Twelfth Infantry in the capture of Angeles, on August 16, 1899.

The sick rate from all causes save malaria has remained practically stationary since August, 1899, but the number of cases suffering from that disease has trebled during November and December, with a steady increase during October. The type of malaria is not very pernicious, but tends to recur. No typhoid fever was noted at Angeles, but a few cases have recently occurred in three different regiments, showing, probably, a common source of infection encountered at some halting place on the recent advance.

The difference has been startling between the sick rate of regiments at the front doing constant outpost duty, subject to night attacks, and having to make periodical advances through difficult country, and that of regiments doing garrison duty at towns farther to the rear. This difference has been manifested even where the permanent stations have been in unsanitary locations. The post surgeon reports Candaba as badly drained and with bad surroundings, but the battalion there gave a sick rate of only 8 per cent, while the troops at Angeles, a comparatively well-drained town, with a sandy soil, gave a rate that was never less than 25 per cent. The troops at Candaba had been on ordinary garrison duty for some time, and those at Angeles had fought their way from San Fernando by successive attacks.

The sanitary regulations have been quite faithfully carried out by the troops. Great attention has been given to the boiling of the drinking water, but I do not believe that the men, even in established camps, can be made to avoid unboiled water entirely, and upon the march the enforcement of this order is impracticable. Authority was given the medical department to purchase quicklime for use in the sinks, but no lime can be found in this climate which is not air-slacked. Great as would be the expense, I should recommend that whenever practicable a sufficient quantity of chloride of lime be furnished to disinfect every sink at least once a day.

It is not in my province to either criticise or commend the administration of the medical department in these islands, but I wish to preface a recommendation with the statement that the organization, equipment, etc., are probably as nearly perfect as they can be made under the conditions which prevail. In my opinion each regiment should have four medical officers, one for each battalion, and a regimental surgeon, and the battalion organization should be further recognized by issuing three smaller sets of medical and surgical chests, each to be complete in essentials in itself,

in addition to the large set now furnished for the regiment. I find that in the regiments the surgeons have been assigned to battalions and take sick call and care for them separately, and that this arrangement, for many reasons, works satisfactorily. A regimental surgeon is needed for purposes of general supervision and administration. The battalion in the new regimental formation is almost as much a unit as the regiment formerly was, and almost as large.

I recommended in a former report that a light spring wagon with two mules be assigned to each regimental medical department, and that six of these wagons be attached to the division ambulance train, to be used in carrying the medical and surgical equipment, so that it may always be ahead of the rest of the transportation and available. The recommendation was not carried out on account of the scarcity of mules, but should be put into effect as soon as possible, I believe, in cases where regiments are likely to have active service in a country where wheeled transportation can be used.

REPORT OF MAJ. H. S. T. HARRIS, SURGEON, UNITED STATES VOLUNTEERS, CHIEF SURGEON OF GENERAL SCHWAN'S EXPEDITIONARY BRIGADE IN SOUTHERN LUZON.

The expedition was formed at San Pedro Macati in the early days of January. An ambulance train of seven vehicles with four mules each and civilian drivers was procured from the Quartermaster's Department. Fourteen Hospital Corps men and an acting steward were assigned to the train by the chief surgeon of the corps. As no transportation could be procured for extra drugs and dressings, one ambulance was loaded with a box of the essential drugs, anæsthetics, dressings, set of medical and surgical chests, and sterilizer; also some special food supplies for invalids.

The expedition consisted of the Thirtieth and Forty-sixth Infantry, nine troops of cavalry, battalion of Macabebe scouts, and several pieces of artillery. The command left San Pedro Macati January 4 and 5, camping in Muntinlupa the night of the 5th.

In taking Binan on the morning of the 6th 4 men were wounded. A field hospital was opened in the town and permanent dressings supplied by Surgeons McDill and Erwin, of the Thirtieth Infantry. On the same night the wounded were sent to Manila on the gunboat *Napindan*. Leaving a battalion of the Forty-sixth Infantry at Binan, the command marched southwest the next day to Silang, which place they occupied that night, the cavalry pushing on to Indang and Naic. They sustained a loss of 2 killed and 2 wounded in taking the towns of Indang, Silang, and Naic. The wounded were afterwards brought by boat from Naic to Manila.

The towns before mentioned having been garrisoned by the Forty-sixth Infantry, the remainder of the expedition started out again from Silang, January 13. The ambulances and wagon train proceeded by Binan and Calamba to Santo Tomas, the troops over mountain trails to Talosay, on the shore of Lake Taal, and thence to Santo Tomas.

The Thirty-eighth and Thirty-ninth Infantry joined the command at Lipa January 15. Four medical and surgical chests for detached service, which had been telegraphed for, were received from Calamba at this point and distributed among the battalions of the Thirty-eighth and Thirty-ninth Infantry. A battalion of the Thirty-ninth having been left at Santo Tomas and one at Lipa, with a small hospital at each place, the remainder of the command occupied Batangas without a casualty on January 16. Fresh supplies were here received from the hospital ship *Relief*.

Leaving a battalion of the Thirty-eighth Infantry to garrison Batangas and one to occupy Rosario, the command proceeded to San Pablo. Outside the latter place, at a point called San Diego, on the afternoon of January 20 the enemy was found intrenched and quite a hot little fight occurred, our loss being 8 wounded and 1 killed. Permanent dressings were applied to the wounded that night at the barrio of Pooc by Captain Erwin, assistant surgeon Thirtieth Infantry, and the writer. The wounded were carried forward with the command next morning.

At Lilio, at noon on January 21, information was received that the enemy was in force at the mountain town of Mayjayjay. The command marched upon this place, leaving orders for the wagon train and wounded to proceed to Santa Cruz. On the 22d the enemy evacuated Mayjayjay without waiting for our attack, and the command proceeded to Santa Cruz, leaving a garrison at Mayjayjay.

The wounded from the fight at San Diego were found at Santa Cruz under charge of Maj. F. A. Winter, surgeon, Thirty-seventh Infantry, and apparently in very good condition. They were shipped to Manila by the gunboat *Oscio* next day. I have since learned that two of the slightly wounded, a week or two after they had received their wounds, showed symptoms of infection from the bacillus aerogenes capsulatus and died. Such infection, I hear, is not uncommon in these islands.

The expedition was completed by a tour made by the commanding general and his staff through the provinces of Laguan and Tayabas, leaving Santa Cruz the 3d of February and returning the 7th.

The work of the Medical Department under the circumstances of the campaign was, I consider, satisfactory. The Thirtieth and Forty-sixth Infantry had been inspected previous to starting and their deficiencies supplied. The Thirty-eighth and Thirty-ninth, however, appeared to have started out rather unprepared and were wanting in both medical officers, hospital-corps men, and equipment.

The medical and surgical chest for detached service was found of the utmost value—small, compact, and complete for its purpose. It was found feasible to carry it with the command by Chinese bearers, and as the column practically never had its wagon transportation with it this proved a matter of the greatest importance. The sick and wounded of the command had to be left at each town which we garrisoned, it being both impossible and inadvisable to carry them farther with the column than was absolutely necessary. This scheme worked fairly well practically, and is about the only one which can be put into effect in such campaigns. The classical plan of a first-aid station on the field with ambulance station, brigade hospital, etc., does not apply to the small running fights of such warfare. The wounded must be dressed where they fall and the permanent dressings applied in the town attacked after it has been taken. All the officers of the medical department of the brigade gave most cordial cooperation and assistance on all occasions. Lieut. E. D. Sinks, assistant surgeon, Thirty-seventh Infantry, is particularly to be commended for gallantry in dressing the wounded under fire at San Diego. The ambulances taken from Manila and the hospital-corps men with them were distributed among the different stations garrisoned by the command as needed. All applications for supplies made upon the chief surgeon of the division were filled with the utmost promptitude. Eight men were killed and 27 wounded during the expedition.

ESTABLISHMENT OF GARRISONS.

The primary object of these campaigns and expeditions was to break up and disperse all organized resistance to the authority of the United States. When this was accomplished it was followed by the necessity of occupying all strategic points on the coast and in the interior to protect life and property during the unsettled condition of the country consequent on the dispersion of the insurrectos. The troops, instead of being massed by brigades, became scattered as garrisons in towns and villages. Even the companies of a battalion were not always stationed at the same post. This change in the character of the service required of the troops had an important bearing on the medical administration. The number of medical officers which had sufficed for field service when the troops were massed was wholly inadequate to furnish post surgeons to every post under the new and suddenly developed conditions. A scarcity of medical officers was specially marked in the case of the troops occupying the Camarines. Although the personnel of the medical and hospital corps assigned to duty with this brigade was considered by the chief surgeon to be sufficient to meet the exigencies of service, the splitting up of the brigade into a large number of small commands for the occupation of the country rendered it impossible for him to assign a medical officer to each of these detachments. (See report on page 151.) In another instance seven medical officers were assigned to duty with one regiment, yet some of the stations garrisoned by this regiment had to be left without a resident surgeon. As it was impossible to obtain a medical officer for every station, it became necessary to place selected men of the hospital corps at subposts and with small detachments to care for slight cases and call upon the surgeon of the nearest garrison when his assistance was required. In several instances a medical officer has been responsible for the care of three or four subposts or detachments, 5 to 15

miles apart, when, owing to the hostile condition of the country, an escort was necessary for his protection in making his visits to them. Similar conditions have frequently existed in our own Western Territories, or so-called Indian country, prior to the extension of railroads over them and their subsequent settlement and cultivation. To relieve the stress of this situation medical officers and acting assistant surgeons were sent out by every transport which sailed from the United States for Manila. On December 31, 1899, there were 257 medical officers in the Division of the Philippines. This number was considered sufficient by General Otis. On January 11, 1900, Colonel Greenleaf, chief surgeon, estimated the number of medical officers required at 360. His report of April 30 records the presence of 356 in his division, and his report of May 31, 364. From January 1 to June 30, 1900, 126 medical officers were sent to the Philippines.

This subject is explained in full in the following communication:

AUGUST 15, 1900.

SIR: Referring to recent cablegrams from Manila calling for 100 more medical officers for service in the Philippines, I have the honor to invite your attention to the following facts:

The return of Colonel Greenleaf, chief surgeon at Manila, for December 31, 1899, shows that the number of medical officers in the Philippines upon that date was: Regulars, 45; volunteer staff, 22; regimental, 63; contract surgeons, 127—a total of 257, or something over 4 per thousand of strength of the command, estimated at 60,000. Since that date the number of troops has not been increased, and a recent report shows that the health conditions have been quite favorable. The total number of sick during the first five months of the year 1900 has not at any time exceeded 9.65 per cent of the command, and has averaged 8.08 per cent. Colonel Greenleaf's predecessor (Colonel Woodhull) anticipated a much larger sick rate and represented the necessity of additional medical officers in view of the greatly increased amount of sickness which he anticipated. General Otis, however, as I am informed, did not consider more medical officers necessary at that time. He, however, at a later date, March 28, 1900, asked for 30 medical officers, "this because of numerous new stations established."

In a letter from Colonel Greenleaf dated January 11, 1900, he says:

"A similar difficulty presents itself in the matter of medical officers, of whom there is also an insufficient number for the current wants of the service. At least 75 more are required to complete the number necessary, in my opinion, for the medical service of the troops now in the islands, viz, three-fifths of 1 per cent of the aggregate force. There are now 285 medical officers here; there should be 360, estimating the present force at 60,000 men."

This letter was not received at my office until February 12. From February 1 to April 30, 77 medical officers were sent to the Philippines in compliance with this demand, and on April 30 Colonel Greenleaf's report showed the total number of medical officers in the Philippines to be within four of the number fixed in his letter of January 11, above referred to, viz: Regimental surgeons, 72; United States volunteers, 26; regulars, 47; contract surgeons, 211; total, 356.

On February 5 I cabled to Colonel Greenleaf as follows: "Ordered to Philippines since December 1: Commissioned, 8; contract, 28. Of these 22 have sailed." The following day he cabled to me: "In great need of 40 more." At this time his letter of January 11 had not been received, and it is evident that his cable of the 6th, following mine of the 5th, was a request for 40 more in addition to those who had already been ordered. During the months of February and March 44 were sent.

On March 12 Colonel Greenleaf cabled: "How many medical officers?" and I replied: "Sailed since February 1, 9; awaiting transportation, 30; contracts will be made with 20." On March 28 General Otis cabled, as above stated: "Still needed, 30 medical officers; this because of numerous new stations established." During the month of April this requisition was filled, 33 medical officers having been ordered during that month to the Philippines.

In a letter dated February 10 Colonel Greenleaf says: "I think you ought to know the exact truth of affairs here, and for this reason have written as plainly as possible, and also that you may thoroughly understand my reasons for asking for 40 more medical officers. Now that organized resistance on the part of the insurgents has practically ceased and military operations are confined largely to hunting down brigands, the desire for service in the Army is fading out, and it will not be long before

many of the contract doctors now here will give up their contracts and ask to return to the United States. I think it would be wise to have a reserve force of from 25 to 50 medical men distributed throughout the islands who could be called upon to fill vacancies that will occur in the future through these causes."

This letter of February 10 is evidently in explanation of his cablegram of February 6, and simply confirms the request for 40 more, with the suggestion that it would be well to have from 25 to 50 in addition as a reserve force. At this time we had in service the full number of medical officers authorized by law, the act making appropriations for the support of the Army for the fiscal year ending June 30, 1900, having appropriated for 400 contract surgeons only; but in view of Colonel Greenleaf's statement in his letter of January 11, 1900, I requested the military committees of both Houses to make appropriation for the fiscal year ending June 30, 1901, for 480 contract surgeons. The appropriation was made, but with the limiting clause, "Not to exceed 480." Therefore, up to June 30, 1900, the limit fixed by law was 400 and after that date 480, a number which I supposed at the time the estimates were made would be ample, a supposition which was justified by Colonel Greenleaf's estimate above referred to; that is, for the Philippines a total of 360 medical officers.

In a letter dated March 15 and received at this office April 19 Colonel Greenleaf says:

"Since my last letter to you about twenty new posts have been established, some of them on the seacoast and some in the interior. Many of them are yet without medical officers, and I was very much gratified to receive your cable message announcing that I might count upon 59 doctors within the next two months."

In a letter dated May 15 Colonel Greenleaf says:

"I desire to add that there should be kept up a constant stream of medical officers to this division to take the places of those returning. There is already a list of 22 acting assistant surgeons who have applied for annulment of contract, but the general conditions have been such that I have been compelled to hold them as a military necessity. This has created much dissatisfaction, and, as you will observe in a letter going by this mail, one of them has deserted. There should be from 5 to 10 medical officers sent out on every steamer leaving the United States until our medical needs are fully met, at which time I can easily cable you and the supply can cease."

This constant stream of from 5 to 10 medical officers it has been my aim to maintain. Sixteen contract surgeons were ordered to the Philippines during the month of May and 19 during the month of June. In all, 126 medical officers were ordered during the six months ending June 30, and I had reason to believe upon this date that I had met as promptly as was practicable the demands for medical officers which had been made by the general commanding the Division of the Philippines and by his chief surgeon. But, upon July 14, during my absence from the city on an inspecting trip, a cablegram was received from Colonel Greenleaf as follows:

"Need 100 medical officers, 300 Hospital Corps, Philippine Islands."

In a letter from Colonel Greenleaf dated June 7 he says: "There is a deficit of 120 medical officers in the Philippines, but I think 75 men could be made to supply the present deficit of 120, and thereafter regular detachments of 10 each month should be sent here, to meet the pending resignations and casualties, as heretofore recommended." This letter was received at my office July 19, during my absence on an inspecting trip. Colonel Greenleaf's cablegram of July 14 was forwarded to me at San Francisco, and I immediately instructed the Acting Surgeon-General to make contracts at once with 10 physicians who, having passed a satisfactory examination, were available, and to order the immediate examination of all desirable applicants. Upon my return to Washington, July 23, I immediately brought the matter to the attention of the honorable the Secretary of War and represented to him that it was impossible to supply the demand for medical officers in the Philippines and in China without exceeding the limit of 480 contract surgeons fixed by the act making appropriations for the fiscal year ending June 30, 1901. On July 27 I received the following order from the Secretary of War, and immediately announced through the public press that 100 more contract surgeons were wanted:

WAR DEPARTMENT, ADJUTANT-GENERAL'S OFFICE,
Washington, July 27, 1900.

The SURGEON-GENERAL UNITED STATES ARMY.

SIR: Referring to your letter of the 26th instant regarding the representation of Colonel Greenleaf, chief surgeon of the Division of the Philippines, that more medical officers are greatly needed in that division, and to your expressed opinion that to meet the requirements in Manila and in China it will be necessary to employ under contract more than 100 additional physicians, etc., the Secretary of War directs that as many medical officers of the Medical Department as can be spared to meet the

requirements of General MacArthur in the Philippines be sent there, and authorizes the employment of a sufficient number of contract surgeons to make up such deficiency in the number required to meet the present emergency, after such medical officers of the Army and contract surgeons now in service as can be spared from other points are ordered on this duty.

Very respectfully, H. C. CORBIN, *Adjutant-General.*

More than 1,500 applications were received, and from among those who first applied I selected more than 150 who were authorized to present themselves to medical boards for examination as to their physical and professional qualifications for foreign service.

GEO. M. STERNBERG, *Surgeon-General.*

THE SECRETARY OF WAR.

Those who passed a successful examination were at once ordered to San Francisco to be sent by the first available transport to the Philippines or to China. Eighteen sailed in the month of July, 83 in the month of August, and 41 in the month of September. In addition to this, 16 commissioned medical officers have been sent since July 1. In compliance with recent orders all of the medical officers who accompanied troops to China will go to the Philippines, except such as are required for duty with the legation guard of 1,500 men.

Most of the towns or pueblos occupied by our troops had roomy convents or churches, which were used as quarters for the commands, the friars having left the country during the insurrection. Private residences also were utilized as barracks, and, as a rule, the troops were well and comfortably housed.

Hospitals were immediately organized in these garrisoned towns—well-equipped establishments in those which were the headquarters of regiments, post hospitals in those having smaller garrisons, and dispensaries at places occupied by subposts or detachments. In addition to these local hospitals, base hospitals were organized at points on the seacoast or on rivers which had the best communication with interior stations. Thus, in the Department of Southern Luzon base hospitals were established at Calamba and Santa Cruz on the Laguna, and at Bacoor, Batangas, and Lucena on the seacoast. So in the other departments. Light cases remained in quarters at the subposts and minor garrisons; cases of greater gravity were transferred to the regimental hospitals; chronic cases were sent for treatment to the base hospitals, and these establishments when overcrowded were relieved by sending selected cases by the railroad, or from seacoast stations by the hospital ship *Relief*, to the larger hospitals in Manila. Colonel Greenleaf, chief surgeon, on February 10, 1900, gave the following tabulation of the hospital accommodation in the Division of the Philippines:

Manila:		
First reserve	791	
Second reserve	323	
Hospital No. 3	263	
Santa Mesa	600	
Convalescent, Corregidor Island	220	
		2,197
Hospital ships:		
Relief	234	
Missouri	300	
		534
First division:		
Base hospital, Calamba	100	
Second Brigade, Bacoor	120	

First division—Continued.		
Field hospital, Santa Cruz	60	
Field hospital, Naic, Cavite	40	
Tayabas	30	
Santo Tomas	50	
Batangas	50	
		450
Second Division:		
Field hospital, Angeles	180	
Base hospital, Dagupan	350	
Branch brigade hospital, Cabanatuan	60	
Field hospital, San Miguel de Mayumo	30	
		620
Visayan military district:		
Brigade hospital, Iloilo	300	
Post hospital, Cebu	150	
		450
District northwestern Luzon:		
Brigade hospital, Vigan	60	
Bangar	25	
Candon	25	
Narbacan	10	
Laoag	30	
San Fernando	30	
		180
District Mindanao and Jolo:		
Zamboango	30	
Jolo	30	
		60
Aparri		50
Regimental hospitals		750
Total		5,291

The establishment of post and regimental hospitals was of great benefit in relieving the base hospitals and those in Manila, for prior to this time all men taken on sick report had been sent away from their commands to these hospitals. Men who might have been returned to duty after a rest of a few days with special diet were sent to district hospitals, where their retention for want of facilities for their return to their command in many instances increased the numerical percentage of sick.

The distance of some of the posts from lines of transportation and the difficulties presented by mountain roads occasioned for a time a scarcity not only of medical supplies but even a shortage of rations. According to the chief surgeon all posts in Nueva Viscaya were temporarily on short rations. Fresh beef and potatoes were scarce and seldom issued up to April 20, 1900.

Many of the interior garrisons are cut off from communication with their base by the impassability of the roads during the rainy season. Care, however, has been taken to provide them in time with a full six months' supply of medicines and medical and hospital stores.

MUNICIPAL SANITATION.

The sanitary condition of the garrisoned towns and villages is described as having been execrable. Filth of all kinds underlay and surrounded the houses, and the hogs were the only scavengers. For the protection of their commands in such localities post commanders were required to consult with the local authorities with a view to remedy these conditions, and a great reformation in this respect was

speedily effected. There appears no doubt that the sanitary condition of the garrisoned towns has been greatly improved since the advent of the American troops. In Manila the board of health, consisting of army medical officers, has done excellent work during the past year under the presidency of Maj. Guy L. Edie, surgeon, United States Volunteers, whose report is submitted below, page 213. To suppress the spread of smallpox among the native population vaccine matter, prepared under the supervision of this board, was sent to medical officers in the various military districts, and arrangements were made for a systematic vaccination of the people. See the report of Chief Surgeon Maus, Department of Northern Luzon (infra page 116).

The following letter from Col. Charles R. Greenleaf, assistant surgeon-general, United States Army, chief surgeon Division of the Philippines, in relation to the sanitation of Manila and other large cities in the islands, was addressed to the adjutant-general of the division May 21, 1900:

I have the honor to submit herewith memorandum recommendations on municipal sanitation, for the present application to the city of Manila and to other large cities in the archipelago. It is proper to remark that maritime sanitation, including quarantine, is in the hands of the Marine-Hospital Service, which has its representatives on duty in Manila now engaged in equipping a plant at the quarantine station at Marivales.

Municipal sanitation.—This is now, and has been since the occupation of Manila by our troops, in the hands of a board of health, consisting of army medical officers. This board has done, under most trying circumstances, excellent and efficient service, so far as it has been able with the limited means at its disposal, but it has been hampered by lack of funds, and, owing to the unsettled condition of civil affairs, by the absence of a municipal administrative force that is essential to complete success; nor has it received the encouraging assistance from the late general commanding which the importance of the subject in its bearing on the troops demanded. It has made great progress in cleaning the streets of the city, in removing filth that has been accumulating for years, and in regulating, to a certain extent, the purity of the food supply; it has practically stamped out smallpox by forcible vaccination and revaccination, where that was necessary, and has held in check the progress of bubonic plague, that, after lodgment in other tropical cities, has speedily become epidemic and caused a frightful mortality; but its work has of necessity been superficial, and the good results can only be maintained by a constant vigilance, by a vigorous support from the military authorities, and by a liberal supply of funds. The Spanish laws on sanitation are in most instances well drawn, but they have not been properly executed, and the American additions, while equally good in theory, have been almost as faulty in execution. This is practically the case in overcrowding of habitations, due to the rapacity of the house owners, who, in their eagerness for gain, disregard all law, and fill their tenements to the utmost capacity of the rooms. It is to secure these important aids that the inclosed memorandum is submitted. The work to be done is an immediate and pressing necessity, but should not obscure the greater necessity for a permanent sanitary organization. So soon as municipal government is organized there should be appointed a capable sanitary engineer, a superintendent of public buildings and works, and a board of health, to decide upon and formulate methods for disposing of excreta, garbage, street waste, etc., whether by water carriage (sewerage), cremation, sea dumping, or otherwise; for securing a pure food supply, including inspection of meats, vegetables, fruits, etc.; the construction and care of markets; for improving the water supply, increasing its quantity, and insuring its purity; for cleaning the "esteros," constructing tide gates, and walling their banks with masonry or concrete, so that they will not only carry off the surface drainage, but will serve as highways for commerce through various parts of the city; and for the adoption of general health regulations, such as are now in force in any larger American cities.

1. A strict enforcement of existing rules, both municipal and military, regarding cleanliness about habitations, the emptying of privy vaults, dry-earth closets, and cesspools, and the flushing of drains and sewers. In the nipa house districts, an insistence upon the use of dry-earth closets by the occupants; in the markets, cleanliness to be enforced and no person to be permitted to live in them, and for this purpose that a market inspector be appointed for each market, who shall be present from

its opening to its close, and make prompt report to the board of health of any disobedience of the rules.

2. A strict compliance with existing laws, and such alterations therein as in the judgment of the board of health will best conserve the public health.

3. The prevention of overcrowding in habitations, by the promulgation of an ordinance making every house owner amenable to a fine or imprisonment, or both, if more persons than specified according to surface (18 square feet) and cubic air space (not less than 300 cubic feet) are permitted to live in their houses.

4. The removal, where practicable, of persons from premises that are now overcrowded.

5. To give effect to these matters, the appointment of a building superintendent to act as special inspector over that subject; the enforcement of a strict compliance with the rules governing the issuance of licenses to build and occupy habitations, and if necessary an increase in the number of sanitary inspectors to insure efficiency in house, lot, and street cleaning, and the removal of garbage and ashes. When house owners fail after due notice to clean their premises, the board of health to have it done, charging the cost against the owner.

6. For the removal of night soil, a sufficient number of large scows to be provided that can be towed into the bay and emptied at a place not nearer the city than Cavite Point, and as much farther from there as will insure the deposit from being returned by ocean currents to the vicinity of the city; street sweepings, garbage, and under certain conditions portions of night soil, to be cremated as at present, and when approved by the board of health, disposed of to surrounding farms.

7. During the wet season, the moat around the walled city and all "esteros" in the city limits to be dredged and thoroughly cleaned.

8. For the prevention and care of infectious diseases: (*a*) A continuance of the present system of house-to-house inspection, the segregation of suspects or developed cases, the quarantine of the house and its inmates during the incubation period of the disease, the thorough cleansing and disinfection of the premises and the occupants' effects, and the destruction, so far as practicable, of vermin. (*b*) The construction of a temporary (nipa) infectious-disease hospital, to take the place in site and bed capacity of the present tent hospital, which, during the rainy season, will be unsuited to its purpose.

9. The promulgation of an ordinance requiring compulsory vaccination of all unprotected inhabitants, and that after the opening of the schools no one shall be admitted as a pupil except on presentation of a certificate of recent vaccination or revaccination.

10. That the interpretation and enforcement of laws governing municipal sanitation be under direction of the board of health.

A communication on the subject of leprosy was addressed to the military governor by the chief surgeon June 4, 1900, in which he represented the number of lepers in the archipelago to be about 30,000, and urged the advisability of taking immediate steps to protect the healthy population from future infection. He submitted a "projet" for the segregation and care of lepers in the islands. The plan, which was drawn up with the assistance of Major Edie, president of the board of health, and Maj. L. M. Maus, surgeon, United States Army, both of whom had given much study to the subject, was as follows:

As a large number of the people in these islands are the subjects of leprosy, and their presence has become a menace to the safety of the healthy population, it is recommended:

1. That there be set apart any land or portion of land now owned by the government for a site or sites of an establishment or establishments to secure the isolation and seclusion of such leprous persons as in the opinion of the board of health or its agents may, by being at large, cause the spread of the disease, and that the government acquire for this purpose, by purchase, exchange, or condemnation, any pieces or parcels of land which may seem better adapted to the use of lepers than any land owned by the government.

2. That a board of public health for the archipelago be organized without delay, with full authority to deal with all questions affecting the public health and sanitation of the islands, and to appoint the necessary agents to carry out its work.

3. That a board of officers, consisting of one medical officer, one quartermaster, and one judge-advocate, be detailed to select one or more suitable islands, and to prepare plans and estimates for buildings, submit an estimate of salaries for the necessary offi-

cials, etc., and fix the rations and other allowances necessary for the support of the lepers and the colony. A list of the islands that is thought to be suitable for the purpose is herewith submitted.

4. That the board of health or its agents be authorized and empowered to cause to be isolated and confined on the island selected, all leprous persons who shall be deemed capable of spreading the disease; and it shall be the duty of every police and district authority, when properly applied to for that purpose by the board of health, or its authorized agents, to cause to be arrested and delivered to the board of health, or its agents, any person alleged to be a leper within the jurisdiction of such police or district authority; and it shall be the duty of police officers and others of like authority to assist in securing the conveyance of any person so arrested to such place as the board of health or its agents may direct, in order that such persons may be subjected to medical inspection; and thereafter to assist in removing such persons to the place of isolation, if so required by the agents of the board of health, and that the following memorandum regulations to facilitate the segregation of lepers be adopted.

5. Whoever shall knowingly detain or harbor on premises subject to his control, or shall in any manner conceal or assist in concealing, any persons afflicted with leprosy, with the intent that such person be not discovered by or delivered to the board of health or its agents, or who shall support or assist in supporting any person having leprosy living in concealment, shall be deemed guilty of a misdemeanor, and shall, upon lawful conviction thereof before any court, be liable to a fine of not more than $100.

6. It shall be the duty of every officer or deputy having reason to believe that any person within his district is afflicted with leprosy to report the same forthwith to the agents of the board of health within such district, if any; otherwise to the nearest agent of the board. Any police officer who shall wilfully fail to comply with this provision shall be deemed guilty of a misdemeanor, and, upon conviction thereof before any police or district court, shall be fined in a sum not less than ——— nor more than ——— dollars, and shall be dismissed from office.

7. The board of health is authorized to make arrangements for the establishment of hospitals in the islands where leprous persons, in the incipient stages, may be treated in order to attempt a cure; and the said board and its agents shall have full power to discharge all such cases as it shall deem cured.

8. The board of health, or its agents, may require from patients such reasonable amount of labor as may be approved by the attending physicians; and may further make and publish such rules and regulations as by the said board may be considered adapted to ameliorate the condition of lepers.

9. No person not being a leper shall be allowed to visit or remain upon any land, place, or inclosure set apart for the isolation and confinement of lepers without the written permission of the president of the board or some officer authorized thereto by the board of health, under any circumstances whatever; and any person found upon such land, place, or inclosure without a written permission shall, upon conviction thereof before any police or district court, be fined in a sum not less than ——— nor more than ——— dollars for such offense, and in default of payment to be imprisoned at hard labor until the fine and costs of court are discharged in due course of law.

10. It shall be lawful for the board of health, through its president, to make and promulgate such rules and regulations as may be from time to time necessary for the government and control of the lepers placed under its charge, and such rules and regulations shall have the same force and effect as a statute law, provided always that they be approved by the proper authority and that they be published in two newspapers published in Manila.

11. Rules and regulations for lepers and attendants living at the leper settlement in reference to leaving the settlement, general sanitation and personal hygiene, building of houses, raising of animals, cultivating of lands, etc., will be made by the board of health in accordance with preceding section.

General remarks.—It is expected that many of the lepers or their friends will build their own houses, as a number of them are fairly well to do.

As the question of leprosy is one that will have to be reckoned with by the inhabitants of these islands for the next one hundred years, it is especially important that the best site be selected and the right beginning be made; and for this reason the appointment of a board which will carefully investigate and study this subject has been so persistently asked for. The former military governor approved the suggestions made on this subject by the Manila board of health and decided to appoint a board of three officers to investigate and formulate a working plan for the isolation of lepers as soon as the conditions in the islands permitted. This paper gives the general plan of handling this subject, and in some points has gone into detail of the legislation needed.

One of the points on which legislation is needed is the prohibition of the carrying of lepers by the masters of the interisland coasting boats without a proper permit, and compelling these same masters to carry lepers upon an order of the board of health.

Suitable islands for lepers.—Lutbang and Golo; about 60 miles from Manilia. They are very rich and poorly populated. These are the most suitable islands.

Polillo; north of Luzon, very large, and could contain very well 30,000 inhabitants.

Batag; beautiful and healthy place; is a few miles from Samar, but could easily be guarded by a small gunboat.

Besides these islands, Dr. Manuel Rogel y Lebres recommends: Jau, in Bohol; Clango, in Cebu; Apo or Refugio, in Negros; an island near Guimaras, in Panay; Limasand, in Leyte; Buad, in Samar; Simara, in Romblon.

The following reports from chief surgeons and other medical officers on duty in the Philippine Islands give interesting details of their service and of the medical and sanitary conditions affecting their commands.

REPORT OF COL. CHARLES R. GREENLEAF, ASSISTANT SURGEON-GENERAL, UNITED STATES ARMY, CHIEF SURGEON DIVISION OF THE PHILIPPINES.

HEADQUARTERS DIVISION OF THE PHILIPPINES,
OFFICE OF THE CHIEF SURGEON,
Manila, P. I., July 13, 1900.

The SURGEON-GENERAL UNITED STATES ARMY.
(Through Military Channels.)

SIR: I have the honor to submit herewith a report of the operations of the medical department in the Division of the Philippines for the six months ending June 30, 1900. Detailed reports from chief surgeons and medical officers commanding hospitals accompany this report, and I have to request that selections be made from them for publication in their entirety in the annual report of the Surgeon-General.

Health.—The health of the army has been good, the sick report from all causes not exceeding 9.6 per cent of the total strength in any one month, the average for the six months being 8.8 per cent. The aggregate numerical sick report by months is herewith given:

Date.	Total strength.	Effective strength.	Ineffective strength.	
			Number.	Per cent.
December, 1899	57,175	52,040	5,135	8.9
January, 1900	63,423	57,833	5,590	8.81
February, 1900	65,936	60,661	5,275	7.9
March, 1900	63,441	57,857	5,584	8.79
April, 1900	62,934	57,255	5,679	9.02
May, 1900	63,484	57,359	6,125	9.65
Average				8.845

The principal diseases were intestinal and malarial, the former showing 35.1 per cent and the latter 23.1 per cent to the whole number of cases. Of wounds and injuries there were 10.6 per cent and of venereal diseases 9.3 per cent. Preventable diseases give a percentage of 44.8 to the whole number.

The total number of deaths from all causes was 826, namely:

	Officers.	Enlisted men.
Killed in action	4	174
Died of wounds	3	40
Accidental deaths		22
Drowned	2	33
Suicides	3	15
Disease	8	522
Total	20	806

Total wounded—26 officers, 348 enlisted men.

There were sent to the United States:

	Regulars.	Volunteers.
Invalided on account of chronic disease	507	379
Insane	60	41
For discharge on surgeon's certificate	144	102
Total sent to the United States	711	522

The relatively small percentage of sick in this army is, in my opinion, largely due to the care and attention given by officers and men to sanitation. An increased appreciation on their part of its beneficial result to health, and consequent increased efforts to carry out its rules with thoroughness, will result in a further diminution of the sick report. Roughly stated, one-half of the sickness in the army could have been prevented if everybody had obeyed the sanitary recommendations of the medical officers. The conditions of army life during the past six months have been much better than at any other period, since the troops have been able to sleep under shelter a great part of the time, and have opportunities to properly prepare their food, to sterilize the drinking water, and to give attention to cleanliness of clothing and person, and, above all, they have not during this period, when actively engaged in the field, been constantly exposed in the trenches and on the march to rain without opportunity to wear dry clothing or to sleep in a dry place. There is much significance in the fact that the smallest percentage of sick is shown in the February report, which covers the period of greatest military activity during the six months, viz, General Schwan's campaign in southern Luzon with over 20,000 men, the occupancy of many places in the southern islands, and the constant "hikes" by General MacArthur's men after ladrones and insurrectos in northern Luzon. These operations were conducted during the dry season, rains being exceptional. Although the heat during the middle of the day was excessive and the men were undergoing great physical exertion, the percentage of cases of heat exhaustion and sunstroke was only a trifle more than one-third of 1 per cent (0.38) to the whole number of sick.

Much has been said and written about the food of the soldier in the Tropics, and the composition of the regular ration has been criticised as being improper, in containing too much meat and too little starch. It has been alleged that the soldier should be fed somewhat after the manner of the native, largely on rice and other cereals and starchy foods, and the quantity of his meat (beef and bacon) diminished. However sound these views may be as scientific theories they are not supported by the results of practical experience. The soldier craves and gets, some way or other, the food he has been accustomed to eat at home, and he eats plenty of it. He wants meat twice or thrice a day, and he eats bacon or uses it in some form or other in his cooking whenever he can get it. He will not eat rice. He has a strong desire for sugar, and the addition of candy to the sales stores has been a great blessing to him. It does not appear, after careful observation, that the food furnished the soldier by the present ration produces sickness either by its variety, character, or quantity, provided it is properly cooked and is eaten in moderation. If the provisions of an act of Congress approved March 3, 1899, to allow the purchase of extra articles of diet for men in camp when serving in "debilitating climates," were reenacted and enforced, the soldier serving in the Tropics would have everything that could be desired in the way of a nutritive and health-giving dietary, since under the provisions of this act he may buy fresh vegetables and occasionally change the character of his meat diet by buying poultry, fresh fish, eggs, etc. It is to be regretted that advantage was not taken of this wise provision for varying the diet of the men in the Philippines, whose physical comfort could have been much improved by this means.

It has been found that the intestinal disorders of the Tropics are mostly due to specific germs and only in exceptional cases are induced by errors in diet. So far as we know the water of this country is their carrier, and when this is sterilized the main factor in the production and propagation of this class of disease is eliminated. The board of officers now studying tropical diseases has been of great assistance in investigating outbreaks of dysenteries and diarrheas, and their demonstrations to commanding officers have done a great deal toward convincing them of the necessity for care in this direction.

Nearly all of the diseases of the Tropics produce an effect on the general economy that does not follow similar diseases in the temperate regions, and that is a lowering of the vital force to such a degree that full recovery of health becomes impossible

so long as the patient is in the tropical climate, and doubtful even after his return to and residence in a temperate climate. The marked increase in the number of regular soldiers over volunteers who have been invalided to the United States and discharged for disability is, I think, due to the baneful influence of the Cuban and Porto Rican climate on the regular soldiers who had not a sufficiently long residence in the United States before coming to the Philippines to fully recuperate from its effects, and therefore speedily succumbed to the new influences of this climate, from which recovery for them was impossible. Apparently the only disease from which complete recovery may be expected by residence at any of the sanitary points in the islands is malaria, but after such recovery reinfection frequently follows exposure. Tuberculosis is rapidly fatal, rheumatism becomes chronic, and I think that even the hot springs of the country, which have a great repute among natives for its cure, will not be effective with Americans. Diarrheas and dysenteries when chronic are incurable here; hence it is evident that there will be a constant stream of invalid patients from these islands to the United States, for the care and disposition of which an organized, well-digested system is desirable. As no report has been made to me regarding the results of transfers to the United States, I am unable to give any other information on the subject than what comes before me here. Regarding the insane, but little can be said, as there is no expert alienist on the islands[1] to examine into their cases and determine their character, nor is there any proper place here where they can be kept for observation. No other course is open, therefore, than to transfer to the United States all cases that, after such study as can be given, are believed to be genuine. Homesickness is a potent factor in producing the condition of melancholia into which many of the cases have passed. The isolation of the troops, their lack of knowledge of the native language, their enforced confinement to the towns they garrison, and the constant nervous strain incident to continued preparation against attack by the enemy combine to produce the mental condition which, for want of a better name, is called "insanity," and which is often completely and effectively cured by the journey to the United States. That this condition is a serious one is evidenced by the fact that the majority of suicides occur in this class of cases.

The health conditions among the natives have been carefully considered and attention is invited to my report (herewith attached) to the division commander, regarding municipal sanitation and the care of lepers; also to the report of Major Edie, president of the board of health of Manila. The division commander has taken a deep interest in these matters and by his direction measures are actively in progress toward carrying out the recommendations that have been made.

Hospitals.—The general principle followed in the management of hospitals has been their establishment in regiments for emergency purposes only, from which those who are very sick may be sent to field hospitals that are equipped to care for such cases, these in turn being evacuated into base hospitals, located at points convenient to rail or water transportation, from whence cases requiring it may be transferred to the United States directly or via Manila. These and the larger hospitals at Manila are equipped with the most complete material available. All have special diet kitchens and operating rooms, and nearly all have pathological laboratories, while the personnel of the Manila hospitals and several in the provinces includes a corps of trained female nurses. One of the hospitals at Manila serves as a general depot for the reception and distribution of cases arriving by water transportation and of those requiring the services of specialists, either for surgical, medical, or diagnostic purposes, its staff including men specially trained in these branches. It has a complete pathological laboratory, in which the board of medical officers who are studying tropical diseases carries on that part of its work. Here also the army medical board holds its sessions. Infectious diseases are treated in separate and isolated wards and the general morgue is located near it. An emergency hospital, under the direct control of this office, has been established and equipped near the dock of the captain of the port, in Manila, to receive and care for, temporarily, patients who arrive on vessels from various parts of the archipelago, in which provision is also made for accident and other emergency cases in the city and from the railway.

The cases for transfer to the United States as invalided are selected by a board of three medical officers in each of the Manila hospitals, who carefully examine the men and recommend only those who have been long ill and whose lives will not be jeopardized by the sea voyage. The cases usually selected are tuberculosis, chronic dysentery, diarrhea, chronic malarial poisoning, rheumatism, and the insane. As previously stated, what the results of the transfers are I am unable to say, as no

[1] At the time this report was written an expert was en route to Manila, P. I., to undertake these duties.

report on that subject has been sent me from the United States. Several reports have, however, been made regarding intestinal cases returned to duty in these islands from the United States, to the effect that there was a speedy return of the disease, with consequent readmission to hospital. This subject demands careful study, for which time and experience is needed. A similar study should be given to the subject of establishing sanitaria for troops that are worn out by field service and its consequent exposures. It is said that the Spaniards had selected sites in the uplands of the island of Luzon for the construction of barracks for this purpose, but I have not seen their reports. So far our experience is against such a procedure, since the most virulent forms of malarial poisoning have been found among troops sent into the elevated valleys for station, or among those who have campaigned in the mountains. The lowlands appear to be the most healthful parts of the islands for Americans. This subject is now under investigation.

There has been but little done in the construction of hospitals, partly because the most desirable points for their location are not yet known, and partly because of the high price of lumber, due to an alleged "combine" among dealers. Two wards of nipa have been built at the Santa Mesa Hospital, at Manila, which increases the capacity of that hospital to 1,000 beds. The construction of additional buildings for 250 beds at the hospital at Corregidor Island was authorized, but the work was suspended on account of the price of lumber. Recommendation will be made to build a new hospital at Iloilo, and to enlarge the hospital at Dagupan, and extensive repairs will be made on other buildings now used as hospitals throughout the archipelago.

Medical personnel.—The administration of the department has been much embarrassed by the scarcity of its personnel. On my arrival the hospitals were undermanned, medical officers being obliged to attend an average of over 100 patients each, and a great many military organizations were without medical care. There were frequent instances of contact with the enemy where wounded men were without any other surgical assistance than that which their comrades could give them. As the troops advanced and were separated from each other to garrison towns, this scarcity increased; frequent requests were made by my predecessor for additional medical officers without avail, and I repeated them, but it was not until the month of March that relief came in the arrival of a small detachment of medical officers from the States, which was followed by others at a later period; the term of service of many contract doctors had meanwhile expired and a great many demanded to be sent home; the division commander approved my recommendation to hold to service, as a military necessity, as many as were absolutely necessary to care for the sick until further relief should arrive, and this is now being done. I have to record the fact that one, Dr. Atkinson, was base enough to desert the service, leaving the sick intrusted to his charge without medical assistance, and taking passage on a commercial steamer to his home in Massachusetts. There are now 120 stations occupied by troops without medical officers; at some of them members of the Hospital Corps perform the medical duty as best they can, at others there is no medical assistance. Many medical officers are obliged to attend from 3 to 5 stations, visiting them at great personal risk, since the country is infested with ladrones and insurgents, and it is not always possible to obtain proper escorts; they deserve the highest praise for their devotion to duty and their heroism.[1] In view of the uncertainty of the tenure of office of contract surgeons, I recommend legislation by which they may be commissioned and given such military status as will insure their continuance in service for the same term and under similar conditions as are required of volunteer officers.

The hospital corps also has been undermanned, and recourse has been had to the employment of natives and Chinese to meet the deficit, who have done satisfactory work, and indeed there is much duty, such as policing, the sanitary service, etc., that can be done only by them. I recommend that authority be given to employ or enlist a certain number of them for permanent service with the medical department in the Tropics.

In view of the large number of men of the Hospital Corps who were found to be unfamiliar with their duties, a system of instruction was organized at Hospital No. 3, Manila, for the purpose of teaching the men who were gathered at that station after arrival from the United States and awaiting assignment, such of their elementary duties as was possible in that limited time. The experiment was successful, and the division commander (General MacArthur) authorized by general orders the establishment of a company of instruction, which was fully organized and placed in operation by Major (then Captain) Kulp, and is now in successful operation. The first class of 43 members was graduated on June 15, 1900, in the presence of the general commanding, with appropriate ceremonies.

[1] See remarks on page 120.

The female nurses have done excellent service. Up to the time of my arrival there was none on duty outside of Manila, but since the islands have been fully occupied by troops they have been sent in small detachments to the larger hospitals in the several military departments, and the field for their service has been accordingly largely extended. Their influence on the sick and on the well has been a good one, and they have, as a rule, been discreet in conduct, amenable to discipline, and possessed of professional ability of a high order.

In hospitals where the nursing is done by females members of the Hospital Corps have but little opportunity for practical clinical instruction or work, their service being almost exclusively given to the police of the wards. For this reason I am of the opinion that where it is deemed advisable to employ female nurses there should not be any hospital corps men for ward duty, the nursing being done exclusively by the female nurses, and that natives should be employed for the ordinary police service. The nurses' ration is insufficient, especially in regard to the night lunch, unless there is a large number of them on duty in the hospital, and I recommend that authority be obtained to permit them to be subsisted from what is known as the 40 cents per day allowance. In fact, the efficiency of the diet department in hospitals would be much increased by extending the authority to use the allowance for the entire personnel, since the present system involves the constant use of two kitchens and separate subsistence accounts for the sick and their attendants, which are seldom correctly kept.

Sanitation.—Experience has taught a majority of the troops the necessity for a strict compliance with the more important regulations for preserving health. As a rule camps and quarters are properly policed, care is taken in the disposal of excreta, boiled water is almost universally used, and attention is paid to the proper cooking of food. Line officers join with medical officers in efforts to maintain a proper condition of cleanliness of the habitations and the persons of the troops. The dry-earth system is used in the majority of stations, excreta being removed by native labor. Where the pit system is necessary the contents are sterilized by fire, coal oil being used as fuel, and in Manila the odorless excavators are used. The Waterhouse-Forbes sterilizer has been of the greatest benefit, and it is hoped that before long every company in the army will be supplied with one. Numerous instances of individual infection by typhoid fever, which is endemic in the islands, have occurred, but there has been no serious extension of the disease among the troops, the sanitary precautions that have been taken having proved sufficient to check it at once. Medical officers are instructed to use the same precautions on the occurrence of a case of typhoid fever that they would with smallpox, viz, isolation of the case and disinfection of all excreta, personal belongings, quarters, and sinks; segregation of suspects, and vigilance in watching the noninfected members of the command. In two instances local epidemics assumed rather alarming proportions before the nature of the disease was recognized—one in a detachment of the Forty-second Infantry at Paete and the other in the Thirty-ninth Infantry at San Pablo, both on Laguna de Bay. Prompt measures were taken along the lines above mentioned. The sick were removed to Manila hospitals, suspects placed in detention camps, thorough cleansing of the towns and quarters, with subsequent disinfection, etc., and the spread of the disease was promptly and completely checked. In Manila the work of the board of health, under the able management of Major Edie, has been very effective. The city has been cleaned, and is kept as clean as conditions will permit; systematic inspections of the food supply are made, the markets are kept in order, and the sick poor cared for. Special attention has been given to the work of checking the advance of bubonic plague, which made its appearance in January. So far there has been no extension of the disease, sporadic cases alone having occurred. Arrangements are now being made to dispose of the leper population of the islands, which is estimated at about 30,000 in number. A projet has been approved by the division commander for their segregation on an island where they can be properly cared for, and under intelligent direction and supervision be made self-supporting. A board of officers is now examining several islands with a view of selecting one that will be suitable for the purpose, after which the measures now formulated for gathering them and establishing the colony will be carried out. A system under which the native population should be vaccinated was instituted by Major Maus in northern Luzon and extended to all the departments in the division. It has been successfully carried out, and smallpox has been almost entirely checked in its progress, but few cases appearing among the troops. There is a large population in those portions of the islands that are still under the influence of the insurgents that can not be reached at present, but so soon as it is safe for vaccinators to go among the people they are sent. Vaccine farms have been established in the Department of the Visayas and in Mindanao, it having been found that the virus sent from Manila was often spoiled during the journey to the southern islands.

Means of transportation.—The hospital ship *Relief* has been utilized to expedite the transportation of medical supplies to points along the coast. During the campaigns under General MacArthur in northern Luzon and General Schwan in southern Luzon her service in this respect was invaluable, and without her there would have been great hardship and suffering. She followed the movements of the troops, touching at such points as were convenient to take off the wounded and those suffering from heat exhaustion, and landing such supplies as were needful. This service was often performed at great personal risk, and on several occasions the launch was fired on, Major Perley narrowly escaping injury at Vigan and at Bacoor. Her officers and men deserve great credit for their service on these occasions. Later on she took supplies to the ports on the west coast of Luzon and to those in the southern islands and the Camarines. I have in previous communications set forth the necessity for light-draft steamers for the use of the Medical Department in these islands. While the Quartermaster's Department claims theoretically to be able to meet the wants of the Medical Department in the transportation of supplies and to give precedence to it in loading its ships, it does not do so practically, and, as as a matter of fact, it can not. So far as the intentions of its officers in this division are concerned, they are good, but military necessities often dominate all other claims, and the Medical Department has been obliged to wait at times when the interests of the sick required prompt action. There can never, in my opinion, be a thoroughly efficient administration of the supply department of the medical service until it has its own water transportation. For hospital service on Laguna de Bay and for ports established on Manila Bay near the city the launch *New York* is supplied and has done fine service. Like the *Relief*, she was used with great success during General Schwan's campaign, and when his troops appeared at Santa Cruz at the end of the work she was in waiting with supplies and to take care of the wounded. Acting Hospital Steward Hobson, in charge, deserves special mention for excellent service on this launch. He has been on duty with her since the occupation of Manila, and has often been under fire. The only railway in Luzon is laid between Manila and Dagupan, and is about 120 miles long. It was of great service in bringing wounded to Manila during the expedition of General MacArthur, but no special arrangement had been made for their comfort on the cars in use. Two cars are now fitted with folding steamer bunks for eight patients. There is a small dispensary and a closet on each car, which carries a personnel of an acting hospital steward and two privates. Patients are transferred from points south of Angeles to the hospital at that station and north of that to Dagupan. The service as now organized is very efficient. Ambulances are assigned to commands wherever they are needed, and, while the number is small, they do good service.

Medical supplies.—Until quite recently there has been a general depot at Manila, with subdepots at such points in the division as could be easily reached by water and rail transportation and were convenient to the troops. These and all interior hospitals, base and regimental, were as fully supplied in May as their storage facilities would permit, to meet the wants of the troops during the rainy and typhoon seasons, when travel would be difficult or altogether interrupted.

The methods of issue from the United States are not as satisfactory as they should be, and the points of failure have been submitted to the Surgeon-General for his action. Much embarrassment has been experienced in the length of time consumed in getting supplies from the United States, and the irregularity of their shipment and arrival here have made it impossible to lay any definite plans for responding to calls on the central depot. The losses by disaster at sea have been heavy, and many packages have gone astray, which made it necessary to purchase somewhat extensively in local markets and from Japan to make good the deficits. The ordinary expenditure of medical supplies for the troops is much larger in this climate than in the United States, owing to the extensive prevalence of malarial and intestinal disorders and the necessity for prophylaxis. To this must be added the issues to small commands, which are proportionately larger than to commands of greater size. Although there is no official record of the fact, I am satisfied that a heavy drain also falls upon the supply department through issues to the indigent sick natives, whose appeals to medical officers for relief can not be resisted, in spite of orders forbidding such use of medical supplies that have been issued to the troops. As a general rule, however, it has been possible by judicious management to meet most of the demands, and there has as yet been no serious complaint of shortcomings in that direction. By a recent order of the division commander depots of supply have been established and equipped for the departments of Northern and Southern Luzon, and hereafter each department will issue its own supplies to the troops within its limits.

Requisition has been made for thirteen ice machines, which will be installed at various points in the division and supply the hospitals at all stations accessible to them. Five are already in successful operation at Iloilo, Cebu, Jolo, Cavite, and First Reserve hospital, Manila.

General remarks.—The officers and men of the division have been zealous and diligent in their service, and in many instances have cheerfully performed double duty, involving great hardship and personal risk. I wish to invite special attention to the admirable service performed by Maj. L. M. Maus, surgeon, United States Army, who took medical charge of the Second Division when its medical service was in a deplorable state. He soon established an efficient working system, restored order, replenished supplies, established hospitals, and procured reports that had been long neglected. He has displayed a high order of administrative ability, and deserves official recognition for his service.

Capt. John S. Kulp, assistant surgeon, United States Army (now major and surgeon, United States Volunteers), has won well-deserved promotion for his ability in the management of hospital No. 3, Manila, and in the organization and successful conduct of the school of instruction for the Hospital Corps.

A number of medical officers have distinguished themselves by special service in the field and in administrative positions, receiving commendation and special mention from the officers of the line with whom they served. Among them I desire to mention:

Capt. Paul Shillock, assistant surgeon, United States Army, special field service.

First Lieut. Richard P. Strong, assistant surgeon, United States Army, special field service and work in pathology.

First Lieut. Powell C. Fauntleroy, assistant surgeon, United States Army, organizing and management of hospital at Angeles.

Maj. Franklin A. Meacham, surgeon, United States Volunteers, special field service.

Capt. George W. Mathews, surgeon, Thirty-sixth Infantry, United States Volunteers, special field service.

Maj. George H. Penrose, surgeon, United States Volunteers, special field service and hospital organization.

First Lieut. Isaac W. Brewer, jr., assistant surgeon, United States Army, special field service.

First Lieut. Henry S. Greenleaf, assistant surgeon, United States Army, with Sixteenth Infantry in the field and chief surgeon, Aparri.

First Lieut. John Carling, assistant surgeon, Thirty-fifth Infantry, United States Volunteers, special field service.

Contract Surg. Joseph C. Reifsnyder, special field service.

Contract Surg. H. E. Stafford, special field service.

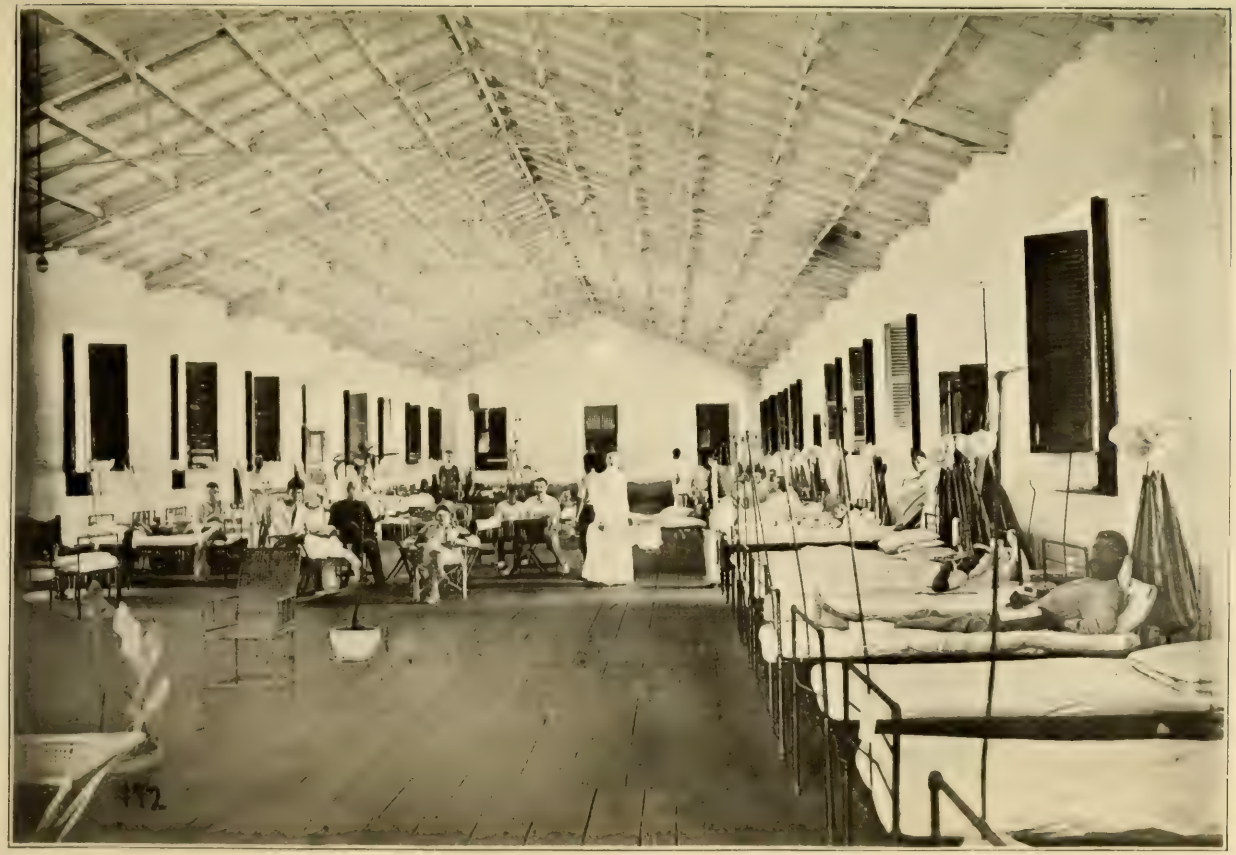
And others whose names have been previously brought to the notice of the Department. I earnestly trust that in the interest of the service and of the officers their special duties may receive recognition and that whatever promotions are at the disposal of the Department for officers in this division may be given exclusively to those officers who have earned them by faithful and meritorious service in the division.

Finally, I wish to join with the medical officers in this division in expressing our appreciation of the devotion to duty of our late comrades First Lieutenants Westmedge and Higley, assistant surgeons, United States Army, whose lives were sacrificed while caring for the sick and wounded that had been placed under their charge. Although sick men themselves and frequently urged to enter hospital, they remained faithfully at their post of duty until compelled by physical weakness to leave it; too late, however, to save their lives.

By reason of their bulk, the separate reports of chief surgeons and commanding officers of hospitals are forwarded direct by mail.

REPORT ON THE FIRST RESERVE HOSPITAL, MANILA, P. I., BY MAJ. W. R. HALL, SURGEON, UNITED STATES ARMY, COMMANDING OFFICER.

The First Reserve Hospital was formerly the Spanish military hospital. It is located about one-fourth of a mile east of the walled city, between it and the Pasig River, which forms the eastern boundary of the hospital grounds. The Spanish hospital proper consisted of a series of buildings erected around a rectangular courtyard, wards on each side, kitchen and dispensary at one end, and a ward and administrative offices at the other end. Storehouses and residences of officials occupied the space between the eastern end of the hospital buildings and the river. A large ⊓-shaped building was used for chapel purposes and rooms for priests and nursing sisters. This wing is now used for the dispensary, surgical ward 7, and operating rooms. The front of the grounds is formed by Calle Arroceros. The northern side is closed by a high stone wall, separating the grounds from a market; the southern side is bounded by Calle Conception, on which street, about 100 meters east of the hospital, is the officers' ward. All the buildings east of the wall are now used



FIRST RESERVE HOSPITAL, WARD NO. 3.

by the medical supply depot for storerooms except one, which is used by the hospital for laboratory purposes. Across Arroceros street, opposite the northern half, is the botanical garden, the pride of Manila, while the southern half is faced by a large, fenced-in grassplot, containing a good-sized brick building, used in Spanish times as a school of arts and engineering, but now used as a warehouse by the medical supply depot and as a laboratory and repair shop by the Signal Corps. On January 1, 1900, most of the tent wards belonging to the hospital, as well as tents for quartering the hospital corps detachment, were located on this portion of land, but as the hospital was contracted in bed capacity these tents were removed, and now, June 1, 1900, the plat is vacant except for the building mentioned. The inner quadrangle is neatly laid out with grassplots and flowers and planted with tropical trees and bushes. Near the kitchen is situated a frame structure used as a reading room for patients. The ground on which the hospital is built has a gentle slope toward the Pasig River. The wards, built of a stone composition, mostly covered with tile roofs, are roomy and well ventilated. They are without ceilings and all have an abundance of large windows. The sewerage was far from satisfactory during January and February, but within the last two months a new system of sewerage has been installed. Nearly all the buildings are supplied with modern water-closets, and most of the old faults have been remedied. Each ward possesses a bathroom with shower bath, and three bathrooms, with four showers in each, are provided for the Hospital Corps. The water supply is ample and of good quality, obtained from the city water system. The drinking water is distilled and is obtained from the ice plant. Rations are drawn every ten days. Cooking is done by Chinamen, paid out of the public funds. The rations issued to the men are of the best, and there is sufficient variety to prevent sameness. On January 1 the wards in use numbered 27, of which 11 were tent wards and the remainder were in buildings.

A necessary institution connected with this hospital is the steam launch. This is a good-sized boat, capable of accommodating 50 to 60 patients with the necessary attendants. In a place like this, where so much of transportation is by water, a steam launch is an absolute necessity. Patients are brought on the boat to this hospital, as well as to Santa Mesa Hospital, from the various posts on the lake and river, as well as from the shores of the bay. Patients are transferred from hospital to the transports about to depart for the United States, the sick and their nurses are taken from steamers arriving in the bay and are transferred to hospitals ashore, parties of hospital corps men arriving on transports are landed with their baggage, emergency calls from posts on the river or on the lake for medical officers or supplies are answered, and official inspection of different posts are made by the chief surgeon. The crew consists of natives, paid by the Quartermaster's Department.

Smallpox hospital.—The smallpox hospital, which is a part of the First Reserve Hospital, is 500 meters south of the hospital proper. The principal building is a frame structure with a nipa roof, 111 by 54 feet, and is divided into two wards. Besides this there is a tent ward consisting of two framed and floored hospital tents for variola suspects and one tent ward for bubonic plague, besides tents for storerooms and quarters for the attendants and guard. The staff of the smallpox hospital consists of an acting assistant surgeon, five privates of the Hospital Corps, and two native laborers. The surgeon as well as the attendants live on the premises.

Laundry work.—The laundry work is done at a steam laundry in the city. The linen is carted away every day and returned clean and ironed every second day. The average cost during the five months from January 1 to June 1, 1900, was $1.05 per hundred pieces.

Diet and kitchens.—The rations for the Hospital Corps are drawn every ten days from the commissary and are sufficient in quantity, of good quality, and sufficiently varied in composition. The articles for patients' diets are purchased from the commissary from the daily allowance of 40 cents, which is found ample to provide good, sufficient, and wholesome diet. The food is cooked by a Chinese cook and is served by hospital corps men. The light-diet kitchen is a separate establishment. Supplies are obtained as needed from the hospital commissary storeroom.

A pathological laboratory, well and thoroughly equipped, is connected with this hospital. At the present time First Lieut. R. P. Strong, assistant surgeon, United States Army, is in charge. All examinations of blood, urine, faeces, sputum, and cultures of all varieties, as well as examinations of specimens obtained from necropsies, are made at this laboratory. These are made not only for this hospital, but for all hospitals and commands in and near Manila, which lack facilities for microscopical investigation or chemical analysis. All necropsies are made at the morgue attached to the hospital.

Ambulance service.—The land transportation consists of 4 ambulances and 16 mules. These vehicles call about the city and outlying stations, at boat landings and the rail-

road station, for patients whose arrival or whose needs are telegraphed to the hospital. There is also a separate ambulance for smallpox patients.

Ice machine.—The ice machine is owned by the Medical Department, but is operated by civilian employees paid by the Quartermaster's Department. The daily output is about 3,700 pounds. From this a sufficiency is retained for the use of this hospital, while the balance is supplied to hospital No. 3, the Second Reserve Hospital, occasionally to Santa Mesa Hospital, and on approved orders to some of the smaller regimental hospitals in the city. On several occasions ice has been sent from here by launch to the hospital at Bacoor, across the bay. A distilling apparatus is connected with the ice plant, which furnishes pure drinking water to this hospital and adjacent hospitals, also to some of the commands in the city. A sterilizing apparatus is operated in connection with the engine running the ice machine.

Female nurses.—There were 77 contract nurses at the hospital on January 1, 1900. During the month 22 were sent away to other stations. In February, 5 more left the hospital, and as the bed capacity of the hospital diminished more of the nurses were detailed to other stations until the number on duty June 1, 1900, was but 19. The nurses' quarters are situated about ten minutes' walk from the hospital. The quarters consist of a large square house, two stories. It contains thirteen sleeping rooms, each accommodating four nurses, large dining room, bathrooms, and kitchen. Part of the ground floor is taken up by a large airy hall or lobby forming a delightful place for rest; in the second story is a large reception room. The grounds around the house are very beautiful. Palms, mangoes, banana and other tropical trees grow in abundance, while a handsome fountain adds to the beauty of the place. The nurses draw the regular army ration, which is prepared for them by a Chinese cook under the supervision of one of the nurses. The general health of the nurses has been good. Ambulances are provided to carry the nurses to and from the hospital during inclement weather and at the lunch hour. The work of the nurses has been satisfactory. They are faithful, conscientious, and untiring in their efforts to assist the medical officers in the care of the sick and wounded. Several nurses have volunteered their services for smallpox cases. The surgical work of the nurses at this hospital has been considerable and successful. At the present time the demand for nurses from the different posts in these islands exceeds the supply. A dietist has charge of the light and special diets at this hospital.

Hospital Corps.—The hospital corps detachment on duty at this hospital on January 1, 1900, numbered 7 hospital stewards, 3 acting hospital stewards, and 183 privates. The majority of the men deserve credit for the manner in which they performed their duties, often very arduous, as during the times when the wards were filled up to their limits. It then required patience, self-denial, and zeal to keep up with the work and provide the necessary care for the sick and wounded. Especial credit is due to men who performed the duty of wardmaster in some of the fever and dysentery wards. They worked early and late, doing their best to relieve and comfort the suffering and render the best possible aid to the ward surgeons. In view of the small amount of pay these men receive, it shows that the chief motive was an unselfish desire to help suffering humanity. It would seem not only just, but also good policy, if some inducement were held out to men to perform duty as wardmaster by a little higher pay than the other privates of the Hospital Corps receive. The hospital stewards on duty at this hospital during January 1 to June 1 have invariably performed their duties faithfully and well.

The surgical department has always occupied a prominent position in this hospital, a good many conditions combining to make it the most important in the city of Manila. The operating rooms are situated in the building fronting on Calle Arroceros, and comprise three rooms—one for operations; one for examinations, minor operations, and dressings; and an annex for dressing of Dhobie-itch cases, and the like. The staff consists of an operator, two competent hospital corps men, and two female contract nurses. The equipment is complete, and the results have been good. A ward for surgical cases adjoins the operating room; thus patients, after capital operations, have to be carried but a short distance to their ward. For a report of some of the surgical work done at this hospital see page 326.

Report on the Second Reserve Hospital, Manila, by Maj. Edward B. Moseley, Surgeon, United States Army.

The Second Reserve Hospital was opened October 3, 1898, by Capt. F. R. Keefer, assistant surgeon, United States Army, in a building in the Malate district of the city of Manila, known as the Convent of the Assumption.

The building, which was a boarding school for girls, is modern, built of brick and stone in the best manner, has ceilings 18 feet in height, handsome tiled floors in most of the large rooms, enormous corridors, and where tiles are not used the floors are made of native hard wood, the boards averaging 14 inches in width, and taking

NURSES' HOME, MANILA, P. I.

a polish like mahogany. The windows on all sides of the building average 9 feet high and 8 feet wide, and give ample light and ventilation in most of the wards.

The building is in the form of an irregular L, and is divided in such a way that twenty wards are available, ranging in size from 27 by 28 feet to 44 by 75½ feet, in addition to which are two corridors in the second-story, 149 by 13½ feet and 215 by 13½ feet in size, which are used for the accommodation of patients, to which they are particularly adapted, being on the outer face of the building, and therefore particularly light and airy. The wards opening on these corridors receive a large amount of light and air owing to the enormous size and large number of the windows in the corridors. The surgical ward and the largest medical ward are particularly well adapted to their respective uses, being very large, light, and cheerful.

On the first floor, around the greater portion of the building, is a porch, floored with handsome tiles, which can be inclosed by movable screens which hang between the pillars supporting the upper second-story corridors. These screens can be lowered to exclude the sun or rain, or to convert the corridor into wards for convalescent patients in case of necessity.

The chapel, a large room, is filled with property belonging to the convent, and can not be used for any purpose, this being specified in the lease made with the sisters by the government.

Dining rooms for full and light diet patients are situated on the first floor; also offices of the commanding officer and clerks. The main kitchen is in a temporary building, erected in the rear of the hospital, which contains four army ranges, and is supplied with water and other conveniences. The special-diet kitchen is in the second story at the end of one wing; it is 43 by 44 feet, with windows on three sides, giving ample light and ventilation. The special-diet cooking is done on several oil stoves, which are very useful for this purpose, as they do not produce the great heat in the building that would be caused by coal stoves, nor do they produce ashes and dust.

A bathroom containing eight porcelain tubs, for use of patients and hospital corps men, is situated at one end of the building on the first floor. Bathrooms and water-closets for medical officers and sick officers are in the opposite end of the building in the second story, near the rooms occupied by resident medical officers and the officers' wards, which accommodate 12 patients.

The dry-earth system of sinks is used for patients and hospital corps men, the boxes being placed in tents conveniently located. Excreta, properly disinfected, is removed by civilian scavengers, under contract, twice a day.

The hospital corps men sleep in roomy and well-lighted dormitories on the ground floor, men on night duty having a separate room, where they can be undisturbed.

Two storerooms on the first floor are used, one for medical property and one for clothing, personal property, and arms of patients. In the rear, at a good distance, is built a stable for the accommodation of government animals and horses of officers. In a separate building is a storeroom for commissary supplies and for carpenter shop and storage of bulky articles. A dispensary, with separate storeroom for drugs and medical supplies, is situated about the center of the building on the first floor.

The grounds around the hospital, about 10 acres in extent, are entirely surrounded by a high stone wall and contain numerous trees, flowering plants, fountains, etc., making the place particularly retired from public view, but very cheerful for patients, who are able to sit in the shade and obtain the benefits of the sea breeze, which is usually strong, owing to the proximity of Manila Bay.

The capacity of the hospital is 312 without crowding, and an increase of 50 could be provided for at any time. It is conducted by 4 medical officers, 2 hospital stewards, 3 acting hospital stewards, 58 privates of the hospital corps, 12 contract nurses, and 19 Chinese and native employees, the latter being employed in the kitchens and various menial work.

This building is so remarkably well adapted by location, by its adaptability as to light, air, sun, and cheerful surroundings, that it is to be hoped it will be continued under lease for hospital purposes indefinitely.

REPORT ON HOSPITAL NO. 3, BY CAPT. JOHN J. KULP, ASSISTANT SURGEON, UNITED STATES ARMY, COMMANDING THE HOSPITAL. RENDERED TO THE CHIEF SURGEON, DIVISION OF THE PHILIPPINES, JUNE 15, 1900.

Hospital No. 3 was established by General Orders, No. 7, Department of the Pacific and Eighth Army Corps, January 19, 1900, from the supplementary wards, without change of personnel or administration.

The institution consists of seven large wooden buildings, each having a single story, elevated 3 feet above the ground. The ceilings are high and the ventilation practically perfect. The general plan is that of a triangle attached to a square. Around the sides of the square are six wards, each having an average capacity of forty-eight

beds, and occupying the sides of the triangle are the baths, laundry, main kitchen, cold storage, carpenter shop, barracks, commanding officer's quarters, quartermaster storehouse, and clothing room. In the building which forms the front of the square are the offices of the commanding officer, officer of the day and registrar, the laboratory, consultation room, commissary storeroom, linen room, medical storeroom, and dispensary. Ward F (acute surgical), which is also in this building, communicates directly with the operating room.

The situation of the hospital is in the district of Ermita, just beyond the walls of the city and about 300 yards from the bay. The proximity of the latter, and the Luneta, renders the place an agreeable one for convalescents, while the buildings and grounds are well adapted for hospital purposes. In this connection it may be stated that the illumination is by incandescent lights, the water supply is from the city mains, and garbage is carried away by boats twice daily.

The bed capacity of the hospital for patients is 297, with 57.5 square feet of floor per bed, and as a rule there are few vacancies. Each ward has attached to it rooms for the hospital corps men on duty and for the property of patients. The number of each bed corresponds with that of a particular locker, and also with that on the patient's card in the office of the registrar. Incoming patients are examined by the medical officer of the day as soon as received; the diagnosis is confirmed if practicable, the diet outlined, and any necessary medication prescribed before the patient is sent to his ward. Each patient is seen at least twice daily by his ward surgeon, who is responsible for everything pertaining to his ward. A permanent consulting board, consisting of the commanding officer, the officer of the day, and the surgeon, is called whenever requested by the latter. The laboratory is equipped for all ordinary clinical work, and the pathologist makes examinations of blood, urine, sputum, or faeces whenever requested by the ward surgeons. A complete record of treatment and of the more important symptoms is kept and filed for reference. Meals for convalescents are served in the main dining hall, which seats 240. Four regular diet lists are furnished, one of which is entirely in the hands of the ward surgeon. A record is kept of every meal served.

Certificates of disability.—This hospital receives for observation all men who have been recommended for discharge on surgeon's certificate of disability. This entails much labor of the highest responsibility, no less than 198 men having been sent to the United States for discharge, and a number convicted of malingering or returned to duty because of recovery or absence of disability. The most common forms of disease are diarrhea, dysentery, malarial fever, and skin and pulmonary affections. Since the renaming of the hospital 1,038 patients have been admitted (whole number 4,207), of whom 5 (whole number 13) have died.

Second in importance only to the treatment of the sick is the instruction of the men of the Hospital Corps. The sanitary soldier of to-day has so many and such varied duties that it is considered indispensable that he should see service, not only in the field and hospital, but in every department of the latter as well. In the field he shares every danger with his brother of the line, and is of value in proportion to the training he has received in garrison. This training consists of (*a*) instruction, (*b*) discipline, and (*c*) experience.

The practical instruction in this hospital consists in handling patients, first-aid exercises, and demonstrations and bedside instruction in ward work. The theoretical instruction is by means of lectures on pharmacy, elementary anatomy, minor surgery, first-aid regulations, clerical work, and nursing. No better form of discipline than military discipline is known, and no better method of enforcing exact and unquestioning obedience is known than by military drill. Every man on duty in the hospital is required to attend five drills weekly, and a soldierly bearing and proper uniform is insisted on at all times. Experience in the manifold duties of the hospital corps private can be best given by constant rotation in station. This involves much labor on the part of the officers of an institution in order not to impair its efficiency, but the final results are believed to justify the extra work.

The following personnel is attached to the hospital:

Medical officers, 2; acting assistant surgeons, 3; noncommissioned officers, 7; privates, 50, and natives, 11; total, 73. The hospital furnishes its own guard, and there are no white civilians, either male or female, attached to it. It is believed that with a properly instructed detachment civilian aid is not only not necessary, but is injurious both in regard to the maintenance of discipline and as tending to prevent the proper instruction of the Hospital Corps.

Repairs and alterations.—Since their use by the medical department these barracks, formerly belonging to the Seventy-third Spanish Infantry, have been so remodeled and improved as to be hardly recognizable. The filth natural to every building in Manila was not lessened by volunteer occupation, and when first assigned for hospi-

VERANDA AND ENTRANCE TO FIRST-STORY WARDS OF SECOND RESERVE HOSPITAL.

tal purposes a more dilapidated lot of buildings it would have been difficult to find. The floor space is three-fourths of an acre in extent, and beneath every building there was tons of filth. When it is considered that the institution has been entirely reroofed, repainted, complete cement walks built, and many portions remodeled, some idea of the transformation can be obtained. A large portion of this work has been done by the men of the Hospital Corps, who have displayed an intelligent interest which is gratifying.

The military hospital differs from the civil in almost every particular of patient, administration, and personnel. Its commanding officer possesses graver responsibilities and greater authority than that of a mere medical superintendent. The technical knowledge of decisions, regulations, and papers which is required to protect the Government, on the one hand, and prevent injustice to the soldier patient, on the other, can be learned from neither book nor school. Physicians and surgeons can always be obtained from civil life in times of sudden army expansion, and after the necessity has passed can return to their waiting homes. This is not the case with the medical officers, whose lives and services are the property of the Government. Whatever increases their value is a gain to the service, and it seems but natural that whenever practicable these men should be taught administrative work in its only school—that of experience. It is believed that the regular medical officers who have served in this hospital have profited by this technical experience so necessary to the military surgeon.

REPORT OF MAJ. H. P. BIRMINGHAM, SURGEON, UNITED STATES ARMY, ON THE SANTA MESA HOSPITAL, MANILA, P. I., MADE TO THE CHIEF SURGEON, DIVISION OF THE PHILIPPINES, JUNE 14, 1900.

This hospital is located at Santa Mesa, a suburb of Manila, and is distant about 3½ miles from division headquarters in the walled city. It is built on a small elevation, or mesa, about 600 yards from the Pasig River and at an elevation of about 60 feet above tide water. The buildings, which were originally intended for infantry barracks, although never used as such, were first occupied by the medical department on November 4, 1899, and the first patients were received November 10, 1899. The site is a good one, comprising as it does a peninsula or neck of land near the confluence of the San Juan and Pasig rivers, and having a decided slope on three sides which insures good surface drainage. The country is open for a considerable distance on either side and unobstructed by buildings on all sides. This with the elevation gives a full sweep to the prevailing southeast breeze and makes a difference in temperature between here and the city of from 4° to 5°, which is the difference in excessively hot weather between suffering and comparative comfort.

The buildings comprising the hospital are the so-called nipa structures common to the country, consisting of a bamboo framework thatched with the leaves of the nipa palm. They are raised from 2½ to 5 feet from the ground, depending on the slope, and the eaves project 6¾ feet beyond the front walls, forming a covered veranda of that width. The walls and partitions are 8 feet in height and do not reach within several feet of the roof at the nearest point in front, thereby permitting of the most perfect ventilation, the projecting eaves preventing the entrance of rain. As a matter of fact the occupants are virtually living in the open air sheltered from sun and rain. This makes a building which is nearly ideal for hospital purposes in this country.

The hospital is laid out in quadrangular form, the quarters for the female nurses and three wards forming one side, the administration building, quarters for noncommissioned officers, barracks for the men, and two wards forming the other side, while the officers' quarters and storehouses are at the north and south ends, respectively. Four new wards recently constructed are built at right angles to the wards on the east side so that the kitchens and dining rooms of the old wards, which are ample in size, may be utilized for the new wards as well. These wards are not yet equipped. The building used as a laboratory, operating room, and dispensary is within and south of the center of the quadrangle and the guardhouse is at the extreme south end. Barracks for 100 men and 4 officers will be constructed shortly southeast of the hospital, for the use of the company of infantry now on duty here as guard.

The capacity of the hospital is 920 beds—5 wards of 120 beds each and 4 of 80 beds each. The personnel consists at present of 5 commissioned medical officers, 5 acting assistant surgeons, 4 hospital stewards, 2 acting hospital stewards, 122 privates of the Hospital Corps, 25 female nurses, and 64 civilian employees. The last consist of 34 Chinese cooks and dining-room boys, 2 Filipino carpenters, 24 Chinese scavengers, 4 ambulance drivers, and 2 Filipino seamstresses.

An ambulance train of seven ambulances and the necessary wagons for transportation of supplies form a part of the equipment of the hospital.

The dietary for the sick, under the allowance of 40 cents for each patient per day, as supplied by the subsistence department, has been ample and satisfactory.

The work of the laboratory, on account of lack of space, is carried on in a room in the same building with the dispensary and operating room. It is wholly inadequate, and the equipment is by no means complete. Plans and estimates of a building for a modern laboratory and operating room combined, which met with the approval of the chief surgeon, have been forwarded. It is to be hoped that this building will be erected at an early date. Requisitions to complete the laboratory both in the pathological and bacteriological departments have been forwarded, approved by the chief surgeon.

The work done in the laboratory, although the equipment as stated is incomplete, has been very satisfactory and has consisted of blood examination of all febrile cases, examination of sputa, stools, and other discharges, the examination and preparation of pathological specimens, and X-ray work.

The water supply is furnished from the mains of the city waterworks. It is ample in quantity and of good quality, but to insure against any possible infection all water used for drinking is boiled. The Waterhouse-Forbes apparatus will be introduced as soon as it can be supplied. Ice is supplied in a sufficient quantity from a private ice plant in the city.

A system of sewerage has just been completed for this hospital, the main sewer of which discharges into the Pasig River. In the rear of each ward are the bathrooms and closets. The method of disposal of excreta in use at present is that of the dry-earth closet. These closets are emptied and thoroughly cleaned twice daily by men employed by the quartermaster's department, and the means employed are as unobjectionable as this method will admit of. The dry-earth closets will be replaced shortly by a system of water-closets with sewer connections. In each bathroom eight showers are available for the advanced convalescents; all others are bathed in the wards. The ward officers are charged with the enforcement of the bathing regulations.

The total number of cases admitted since the opening of the hospital is 3,110, of which 2,178 were returned to duty; 8 were discharged from the service, 7 for disability and 1 at expiration of term of service; 410 were transferred to other hospitals; 28 otherwise disposed of, and 30 died.

Of the total number of diseases treated a large majority were of malarial and intestinal origin, 1,129 cases of malarial fever being recorded, and 333 and 288 of diarrhea and dysentery, respectively.

There were 49 cases of typhoid fever admitted, and when admissions from this disease on these islands is compared with the admissions for the same cause in the home camps and in Cuba and Porto Rico during the Spanish-American war, the comparative immunity from this disease here is notable.

The malarial fevers were almost wholly of the æstivo autumnal variety, although for the most part not of a pernicious type. A profound degree of anæmia, however, followed in many instances, which was very rebellious to treatment, and many patients were invalided home from this cause.

Of the cases of dysentery treated here about 50 per cent were of the amœbic variety, as shown by microscopical examination of the stools. As many of the patients had received treatment for varying lengths of time at base or other hospitals, this estimate is probably too conservative. Another interesting fact is that the amœbic seemed to be more amenable to treatment than the nonamœbic variety. The acute symptoms in most cases responded promptly to the ipecacuanha treatment, 3 to 4 grams, regardless of variety, and with rest in bed and carefully restricted diet many of these cases progressed uninterruptedly to recovery. The majority of the cases admitted, however, were subacute or chronic in character. Blood examinations in nearly all of these cases showed the presence of the æstivo autumnal malaria parasite, generally of the hyaline variety, and the administration of quinine was an important part of the treatment.

The diarrheas admitted did not differ materially from the camp diarrhea seen elsewhere, and were, as a rule, due to the usual causes. A noteworthy fact was the large number of patients admitted for diarrheal disorders who had defective teeth. Even sound teeth seem to deteriorate very rapidly in this climate, and the necessity for a rigid examination of men suffering from defects of this nature who are enlisted for service here and the further necessity for competent dentists to attend to the teeth of the men is obvious.

The amount of surgical work done at this hospital has not been very extensive, owing to the more easy access of the cases coming from the front by rail or boat to the hospitals in the city, and furthermore to the fact that the operations of the troops in the field since the establishment of this hospital have not been as extensive as formerly.

In conclusion, I would like to invite attention to the conscientious and painstaking work done by all connected with the hospital, including the medical staff, the hospital corps detachment, and the female nurses. All worked harmoniously and unremittingly for the common end—the welfare of the sick.

REPORT ON THE CONVALESCENT HOSPITAL, CORREGIDOR ISLAND, MADE JUNE 1, 1900, TO THE CHIEF SURGEON, DIVISION OF THE PHILIPPINES, BY MAJ. W. W. GRAY, SURGEON, UNITED STATES ARMY, COMMANDING HOSPITAL.

Corregidor Island lies across the entrance of Manila Bay from the China Sea, distance 26 miles from the city of Manila. The island is 3 miles long and from one-fourth to three-fourths of a mile wide. The greater part of it rises abruptly from the water, reaching an extreme elevation of 550 feet above the sea. Several plateaus of different sizes are found on the higher points of the island. The hospital is situated on the shore of a small inlet or bay on the north side of the island, and about midway of it.

The hospital was established by Maj. W. O. Owen, brigade surgeon, United States Volunteers, November 25, 1898, and consisted at first of tents and several old Spanish buildings, with a capacity of 250 beds. In the summer of 1899, while under the command of First Lieut. Henry Page, assistant surgeon, United States Army, plans were drawn and contracts let for the present hospital. The first of the new buildings was occupied September 18, 1899. The present hospital has a capacity of 220 beds, and consists of the following buildings:

(1) Ward A, a one-story L-shaped structure, 92 by 92 by 12 feet; capacity, 100 beds.

(2) Ward B, a one-story rectangular structure, 62 by 28 by 12 feet; capacity, 20 beds.

(3) Ward C, a one-story L-shaped structure, 91 by 68 by 12 feet; capacity, 80 beds.

(4) Officers' ward, a one-story rectangular structure, 68 by 28 by 12 feet; capacity, 20 beds.

These four pavilions are constructed of wood, with corrugated iron roofing, elevated about 3 feet from the ground. Sliding windows encircle the buildings and permit the wards to be practically thrown open to the outside air, giving the most complete ventilation. This is a great advantage in this climate, and permits the air space per man to be reduced. Only at rare intervals is it necessary to close the windows, and then for a short time during driving wind and rain storms. Covered porches 5 feet wide extend around the buildings.

The administration building is 50 feet square and two stories in height. The lower story is used as offices; the upper as a dormitory for the detachment of the hospital corps. This building is constructed of wood, with metal roof, and on the general plan of the pavilions. All the buildings are painted white inside and out, with green trimmings, and present a very neat appearance. Storerooms, dispensary, and operating rooms are located in two adobe buildings constructed by the Spaniards. They have been recalcimined and painted, and answer very well the purposes for which they are used. Temporary nipa buildings have been used for the kitchens, but a large and commodious dining hall and kitchen is under construction, and will be completed in a short time. The medical staff are quartered in a structure built by the Spaniards, and formerly used (I believe) by the Spanish officers stationed here. It is adobe in structure, with nipa roof. It consists of three good-sized bedrooms and two smaller ones, besides sitting and dining rooms; all on one floor. These comprise the principal buildings on the grounds of the hospital. Plans have been drawn and approved for the construction of additional wards, which will double the present capacity of the hospital, but as the rainy season is so near at hand they will not be completed before fall.

The site of the hospital slopes gradually back from the bay, rising rather abruptly to 50 or 60 feet above sea level at the officers' ward. The buildings are somewhat irregularly located, due to the site; a main street runs east and west through the grounds, with several streets north and south. The natural drainage is good; open drains carry the surface water to the bay; no closed sewers are used. All excreta, garbage, and débris of every kind is collected daily and carried in open boats out to the sea about half a mile from the shore and dumped into water 50 or 60 feet deep. By this method, under the immediate charge of a noncommissioned officer, the buildings and grounds are kept in thoroughly sanitary condition.

At present tents with dry-earth latrines are used. These are satisfactory during the dry season; but plans have been drawn and approved for comfortable closets and bathrooms. Movable bath tubs are used for the wards. A series of shower baths for those able to walk are located a few yards to the side of one of the main wards.

A reservoir constructed about three-fourths of a mile distant from and 100 feet above the site of the hospital collects water from a small stream. This water is conveyed in pipes to and through the grounds, and is used for the general purposes of the hospital. It has thus far proved sufficient in quantity, although no rain has

fallen for nearly six months. A small condensing plant furnishes pure and wholesome water for drinking. Ice is purchased in Manila. A small ice plant would add much to the comfort and convenience of the hospital and permit the keeping of a larger supply of meat during the stormy season, when it is not always practicable for a launch to visit the island daily.

A small bakery operated by members of the hospital corps furnishes excellent bread to the hospital. The supplies furnished by the commissary department have, as a rule, been of excellent quality. Chickens, eggs, and other articles of diet not directly obtained from the commissary have been purchased partly in Manila and partly from natives residing on Corregidor Island and contiguous territory. The lack of good fresh cow's milk has been a great deprivation, but it is impossible to obtain it in quantity in the islands. The medical purveying department in Manila has furnished, with few exceptions, all medicines and supplies asked for on approved requisitions. A steam launch makes daily trips, except Sundays, between Manila and Corregidor Island, carrying patients, mail, and supplies. Telegraphic communication with Manila is had by cable to Naic and telegraphic line from Naic to Manila on the main shore.

The personnel of the hospital at the present time consists of 1 major and surgeon, United States Army, 3 acting assistant surgeons, 2 hospital stewards, 3 acting hospital stewards, 52 privates of the hospital corps, and 8 female contract nurses, with 4 Chinese cooks, 3 Chinese helpers, and 10 Filipinos employed as scavengers.

Corregidor Island in some respects is almost an ideal place for a convalescent hospital in the Philippine Islands. It enjoys a remarkably equable climate, a mild sea air, with breezes blowing the greater part of the day; no local deleterious or insanitary conditions; good natural drainage; an easily procured water supply; fine sea bathing. After a personal experience of nine months and the records for eighteen months, my observations upon the local and climatic influence of the place in the treatment of disease is as follows: Acute and chronic dysentery and acute and chronic diarrhea have done perhaps as well here as in any other place in the islands, but no special advantage can be claimed. Subacute and chronic rheumatism have not done well. Cases of incipient or advanced tuberculosis have not improved. Convalescents from the various types of malarial fever, including the anæmias and cachexias, have in a large percentage of cases improved in a marked degree. Convalescents from typhoid and dengue fever have done well. Mild types of sunstroke and heat exhaustion have been much benefited. Cases of climatic debility, brought on by hard and exhausting service in the field, have been restored to normal conditions of health in a short time. This fact is shown in the troops which have been sent here from the field as a guard to the hospital. I would suggest that it might be a good plan to encamp here from time to time troops who require rest and restoration after a campaign in the field.

The following is a brief synopsis of the patients admitted to the hospital from December 1, 1898, to June, 1900: Total number treated, 2,712; returned to duty, 1,946; transferred to United States and other hospitals, 587; died, 28; remaining in hospital, 151.

Of the more important diseases there have been received: Dysentery, acute and chronic, 297; diarrhea, acute and chronic, 310; gastritis, acute and chronic, 79; malarial fever, various types, 630; typhoid fever, 96; rheumatism, acute and chronic, 115; tuberculosis, 6; anæmias and cachexias, 111; and gunshot wounds, 105.

A large majority of the cases have been in various stages of convalescence; others in chronic type of the disease, subject to relapses. Acute cases have been received from the troops stationed on the island and also from the post of Marivales, across the bay.

The medical staff have done faithful and conscientious service.

The female nurses have performed excellent service at this hospital. They have been attentive to their duties, and by their cheerful and kindly manner materially aided in the care of the sick.

The detachment of the hospital corps, with some exceptions, have performed their various duties in a cheerful, conscientious, and intelligent manner.

DEPARTMENT OF NORTHERN LUZON.

REPORT OF MAJ. L. M. MAUS, SURGEON, UNITED STATES ARMY, CHIEF SURGEON, SECOND DIVISION, EIGHTH ARMY CORPS, AND OF THE DEPARTMENT OF NORTHERN LUZON, MADE TO THE CHIEF SURGEON, DIVISION OF THE PHILIPPINES, JUNE 15, 1900.

In compliance with your letter of April 12, 1900, I have the honor to submit herewith my report as chief surgeon, Second Division, Eighth Army Corps, and the Department of Northern Luzon, from December 21, 1899, until assigned to the duties of medical and sanitary inspector, Division of the Philippines, June 8, 1900.

I arrived in Manila December 19, 1899, having sailed from San Francisco on the United States transport *Hancock* the 21st of the preceding month. At date of joining—December 27—the headquarters of the Second Division were located in Bautista, province of Pangasinan, a small nipa pueblo 100 miles north of Manila, on the line of the Manila and Dagupan Railroad. General McArthur, commanding the division, had but a few weeks previously reached this point, during the campaign from Angeles North, and temporarily taken possession of a large frame building constructed by an English company for commercial purposes. Not only did the commanding general and staff live, mess, and have their offices in this building, but the clerical force of the headquarters as well.

COMMAND AND ORGANIZATION OF TROOPS.

Command.—The division contained 6 troops of the Fourth Cavalry, 3 batteries of the Third Artillery, and 13 regiments of regular and volunteer infantry, besides 5 companies of Macabebe scouts, with an aggregate strength of 17,766 officers and men. The troops occupied at this time 90 posts, and were stationed in the provinces of Bataan, Bulacan, Nueva Ecija, Pampanga, Pangasinan, Principe, Tarlac, and Zambales.

Organization of troops.—First Brigade, Col. E. H. Liscum, Ninth Infantry, commanding, consisted of the Ninth and Twelfth Regiments of United States Infantry.

Second Brigade, Brig. Gen. F. D. Grant commanding, consisted of 1 battery of the Third Artillery and the Thirty-second, Thirty-fifth, and Forty-first Regiments of Volunteer Infantry.

Third Brigade, Brig. Gen. Frederick Funston, United States Volunteers, commanding, contained 2 troops of the Fourth Cavalry, the Twenty-second and Twenty-fourth Regiments of United States Infantry, and the Thirty-fourth Regiment of Volunteer Infantry.

Fourth Brigade. This command was organized several weeks later, and placed under the command of Brig. Gen. J. T. Bell, United States Volunteers. Two troops of the Fourth Cavalry, the Thirteenth and Twenty-fifth Regiments of United States Infantry, and the Thirty-sixth Regiment of Volunteer Infantry were assigned to the brigade.

The detachment of United States Engineers, Macabebe scouts, and the Third United States Infantry remained unattached to brigades.

General Orders, No. 1, April 7, 1900, issued by the commanding general Division of the Philippines, by direction of the Secretary of War, organized the military divisions of the archipelago into departments. Hence the brigade and division organizations were abolished and the second division was merged into the Department of Northern Luzon, with a very considerable increase in troops and geographical area. The department was divided into 5 military districts, but later on the sixth district was added. At present the department contains an aggregate strength of 25,550 officers and men, scattered over 226 posts and stations, and embraces in its geographical area 21 provinces.

The following is the present distribution of troops in the department:

FIRST DISTRICT.

[Brig. Gen. Samuel B. M. Young, United States Army.]

Organizations.	Provinces.
Third United States Cavalry (8 troops)	Abra.
Thirty-third Infantry	Bantoc.
Thirty-fourth Infantry (4 companies)	Benguet.
Forty-eighth Infantry	Lepanto.
Native scouts (400)	Ilocos Norte.
	Ilocos Sur.
	Union.

SECOND DISTRICT.

[Col. Charles C. Hood, Sixteenth United States Infantry.]

Sixteenth United States Infantry	Isabela.
Forty-ninth Infantry (8 companies)	Cagayan.
	Nueva Viscaya.

THIRD DISTRICT.

[Brig. Gen. J. F. Bell, United States Volunteers.]

Organization.	Provinces.
Fourth United States Cavalry (4 troops)	Pangasinan.
Twelfth United States Infantry	Tarlac.
Thirteenth United States Infantry	Zambales.
Seventeenth United States Infantry	
Twenty-fifth United States Infantry (8 companies)	
Thirty-sixth Infantry	

FOURTH DISTRICT.

[Brig. Gen. Frederick Funston, United States Volunteers.]

Fourth Cavalry (1 troop)	Nueva Ecija.
Twenty-second Infantry	Pampanga, part.
Twenty-fourth Infantry (8 companies)	
Thirty-fourth Infantry (8 companies)	

FIFTH DISTRICT.

[Brig. Gen. F. D. Grant, United States Volunteers.]

Fourth Cavalry (1 troop)	Bataan.
First Artillery (1 battery)	Bulacan.
Third Infantry	Pampanga, part.
Thirty-second Infantry	
Thirty-fifth Infantry	
Forty-first Infantry	

SIXTH DISTRICT.

[Col. J. Miller Thompson, Forty-second Infantry.]

Fourth Cavalry (1 troop)	Infanta.
Twenty-seventh Infantry	Manila, north of Pasig.
Forty-second Infantry (8 companies)	Morong.

Organization of the medical department of the division.—Active operations against an organized enemy of considerable force had just been closed when I joined the division headquarters at Bautista, and the various regiments were scattered along the line of the Manila and Dagupan Railway as far north as the Gulf of Lingayen. As a matter of fact, I did not expect much in the way of medical organization and administration under these circumstances, owing to the frequent changes required during the recent campaign. Each brigade was supplied with a brigade surgeon, but his office duties were merely nominal. Since the medical department had practically been directed from Manila the changes which were occurring among medical officers and hospital corps personnel were rarely known in the office of the brigade surgeon or chief surgeon of the division until long after the orders were issued and the changes effected. The clerical force of the division surgeon's office at this time consisted of one acting hospital steward, and no records were kept worth mentioning. So far none of the official reports, such as monthly personal reports of medical officers, change of status, reports of sick and wounded, personnel of hospital corps, requisitions, etc., ever passed through the chief surgeon's office, and consequently he knew very little of what was transpiring in his division. All these reports and communications were sent direct to Manila by medical officers, in compliance with a circular order issued by the corps commander upon the recommendation of the chief surgeon of the corps. In like manner many of the special orders effecting changes of medical officers and hospital corps personnel within the division were issued in Manila, and not infrequently intermediate orders were issued by brigade or regimental headquarters affecting the status of these men several times before the corps orders were received. Owing to the irregular sources from which such orders emanated it became impossible for the division surgeon to keep either a roster of the medical officers or the hospital corps personnel, and hence the impossibility of making intelligent recommendations for the proper assignment of either officers or men. On the

28th of December I requested the chief surgeon of the corps to send me a roster of the medical officers on duty in the division, to which he replied that the information was so meager in his office that it was impossible to send anything like a correct list. At this time medical officers and the hospital corps personnel were subject to orders issued not only from Manila, but from brigade commanders, regimental commanders, detachment commanders, by other medical officers, and even at times by the authority of the medical officer himself, and it rarely occurred that an information slip or telegram was sent to the division surgeon announcing these changes. The division commander apparently did not feel authorized to issue orders effecting changes in the status of medical officers in his division on account of the control exercised in Manila, but was very anxious to have the matter properly adjusted. Colonel Greenleaf, the chief surgeon of the corps, recognized the impossibility of arranging these details from Manila and approved of the plan of turning the matter over to the division commander.

Duties of brigade surgeons.—In order to define the functions and prerogatives of brigade surgeons I issued, January 10, 1900, the following circular to them and sent a copy to each medical officer in the division:

"I. Brigade surgeons will keep a roster of medical officers, hospital stewards, acting hospital stewards, privates of the hospital corps, nurses, or other employees of the medical department on duty in their respective brigades.

"II. They will keep the chief surgeon of the division informed by telegraph of any changes affecting the status of medical officers or hospital corps personnel without delay, which information will be transmitted to brigade surgeons by regimental or camp surgeons as soon as such changes occur.

"III. The following reports, etc., will be transmitted to the chief surgeon of the division through the office of the brigade surgeon, viz:

"1. Daily consolidated brigade report of number of sick in quarters, hospital, or absent. When reports can not be obtained for each company in the regiment companies missing should be designated.

"2. Weekly inspection report.

"3. Weekly sick report.

"4. Monthly report of sick and wounded.

"5. Personnel of hospital corps.

"6. Statement of hospital fund.

"7. Monthly report of medical officers, information slips.

"8. List of killed and wounded.

"9. Requisitions for medical and hospital supplies.

"10. Information slips containing all changes in the status of medical officers and personnel of hospital corps.

"11. Telegraphic reports of all deaths belonging to the commands within the brigade.

"12. The monthly sanitary report required by regulations should be referred to the brigade surgeon for his information and action.

"IV. Brigade surgeons are expected to make frequent visits to posts and stations within the limits of their brigades for the purpose of inspection, and will make careful inquiries into the administration of regimental and camp hospitals, treatment of the sick, messing, sanitation, medical and hospital supplies, reports, efficiency of medical officers, personnel of hospital corps, and such other matters as may come under their supervision. Frequent reports with recommendations are desired.

"V. All changes in the duties of medical officers and hospital corps personnel serving in the brigade will be made upon the recommendation of the brigade surgeon, with the approval of the chief surgeon of the division. Where such changes are urgent and the exigencies of the service do not admit of delay, brigade surgeons are authorized to take action at once with the brigade commanders, and report the fact as soon thereafter as practicable.

"VI. Requisitions will be prepared by the regimental surgeons for the entire regiments when practicable and forwarded to the chief surgeon of the division through the brigade surgeons. When necessity demands it, requisitions will be made by wire through the brigade surgeons. Regimental surgeons as a rule should not make requisitions for ordinary medical and hospital supplies oftener than once quarterly."

Owing to frequent changes in the stations of medical officers by brigade, regimental, and post commanders, I requested the division commander to issue an order directing that such changes be only made with the approval of the division commander. Telegraphic instructions were sent to brigade commanders on this subject on January 15, but in spite of these orders changes continued to be made without proper authority. On January 26 an order was issued by the division commander which, except in cases of emergency, limited all changes affecting medical officers and hospital corps personnel to division headquarters.

Regimental and post commanders were in the habit of granting leaves of absence to medical officers for the purpose of visiting Manila, and not infrequently officers granting such leaves would immediately make a requisition on the division commander for another medical officer. Owing to the scarcity of surgeons this practice became so frequent that it became necessary to submit the subject to the division commander, who issued the following order:

"The practice of medical officers leaving their stations without informing the chief surgeon having embarrassed the medical administration of the division, such officers will not in future leave their stations, except on duty, without authority from these headquarters."

With the organization of the department came a large increase in territory and troops. By the time this reorganization had occurred the district surgeons had become fairly well acquainted with their administration duties and were in a position to take entire control of the hospital corps of their respective districts. A letter was written to the department commander, recommending that an order be issued to the effect that all changes of this personnel be made by district commanders on the recommendation of district surgeons. The following order was issued on the subject:

"Upon recommendation of the chief surgeon of the department changes affecting stations of medical officers will only be made by authority of department commander. When the case is urgent and the exigencies of the service do not admit of delay such changes may be made by district, regimental, or post commanders, and the facts reported to these headquarters as soon as possible. It is believed that such urgency orders will not be necessary with troops located at points where telegraphic communications may be had. Orders directing changes in stations of members of the hospital corps within each military district will in future be made by district commanders on the recommendation of the chief surgeon of the district. Since the chief surgeon of the department is held responsible for the proper administration of the medical service of this command, district surgeons are directed to notify him immediately after such changes are made."

This transfer of authority has worked greatly to the advantage of medical administration. It was considered advisable, however, to retain control over the assignments of medical officers in the department.

Regimental surgeons.—Three regimental surgeons, one surgeon with the rank of major, one assistant surgeon with the rank of captain, and one assistant surgeon with the rank of first lieutenant, were included in the organization of each volunteer regiment, but curiously enough, in spite of his rank, the captain was only allowed the pay of the first lieutenant. About one-half of the surgeons of the volunteer regiments were selected from the ranking assistant surgeons of the Regular Army. The same regimental organization was applied to the regular regiments in the division except that the regimental surgeons were taken from the junior assistant surgeons of the Army, and in many instances from the acting assistant surgeons. The colonels and other officers of the regular regiments made frequent complaints as to the invidious distinction of selection of medical officers for regular and volunteers. In accordance with instructions received from the chief surgeon of the corps, the regimental surgeon was directed to make out the monthly report of sick and wounded for the entire regiment, the personnel of the hospital corps, muster rolls for the entire regimental detachment, supply hospital and medical supplies, carry all the hospital property on his papers, etc., which was an impossibility in the majority of cases separated and detached, as most of the companies in each regiment were. Very soon the allowance of regimental surgeons for each regiment became inadequate, owing to the number of posts garrisoned and their distance apart. In a number of instances medical officers had to attend from three to four different stations, varying from 4 to 10 miles apart, and owing to the hostile condition of the country it became necessary for them to take a guard, or run the risk of being shot or bolood. The scarcity of medical officers made the medical administration difficult and unsatisfactory, and resulted in many complaints from line officers. As it was impossible to obtain a sufficient number of surgeons, it became necessary to assign intelligent noncommissioned officers or privates of the hospital corps to these stations. In one instance seven medical officers were assigned to one regiment and still others were needed with it. A very large proportion of the medical officers serving in the division were acting assistant surgeons who evidently had come over for the novelty of the trip. Many of them became tired of their contracts and under various pretexts sought to be sent home. A number became unfit for duty on account of sickness and had to be returned to the States. One acting assistant surgeon, finding that he could not get away honorably, deserted the service. I refer to Dr. Roger T. Atkinson, who was stationed at Abucay. The majority of the medical officers on duty in the division were young and inexperienced. This remark applies to the acting assistant surgeons as well as

those belonging to the volunteers and regular corps. I think the service suffered very much on this account. After regiments had become broken up into eight or a dozen posts it practically became impossible for the regimental surgeon to carry out instructions in regard to monthly reports, etc., for the entire regiment. The following circular was therefore issued February 6, 1900:

"I. Regimental surgeons are no longer required to submit the monthly report of sick and wounded for the entire regiment when companies are serving at different stations. The senior medical officer at each station will submit this report in accordance with existing regulations from the Surgeon-General's Office as printed on inside cover of register for patients. This report will be forwarded direct through the brigade surgeon to this office not later than the 5th of each month. Brigade surgeons will see that they are properly corrected before being transmitted. Reports for regulars and volunteers to be made out separately.

"II. Reports from troops where no medical officer is serving will be prepared by the medical officer having indirect charge. Hospital stewards, acting hospital stewards, or privates having charge of such stations should be provided with blank books for making out the daily sick report, and instructed as far as possible in the detail of preparing the necessary data for the medical officer responsible for the report.

"III. The reports of personnel of the hospital corps will also be prepared and forwarded from each station, where medical officers are serving, direct to this office through brigade surgeons. At stations where no medical officers are serving this report will be made out and forwarded by the medical officer having indirect charge of the station.

"IV. Brigade surgeons will also submit the monthly report of sick and wounded for headquarters of brigade and personnel report for members of the hospital corps serving in their office."

Instructions were also given regimental surgeons in regard to muster rolls for their detachments, and they were authorized to have rolls prepared for each station if deemed advisable. The regimental surgeon was required by a circular issued from corps headquarters to carry all the nonexpendable property issued for use of his regiment on his returns. The complications arising from this ruling frequently led to much dissatisfaction and seemed to a certain extent unjust. In many instances the regimental surgeon had to take up property he had never seen and to account for it, although it had been stolen, lost, or destroyed while not in his possession. In the organization of the various camp hospitals, equipment was sent direct from the supply depot without passing through the hands of the regimental surgeon. After a thorough study, both in garrison and field, I have become thoroughly satisfied that the regimental system of medical officers, generally speaking, is a failure. Whether he serves with volunteers or regulars, the medical officer should belong to the general medical staff, and be so situated that he could be relieved and sent elsewhere should the occasion require it. This should also apply to the hospital corps detachment attached to a regiment. Under the ruling the hospital corps detachment attached to a regiment is supposed to belong to it for the time being and follow the regiment under all circumstances. The constant changes in the personnel of camp hospitals, as a result of this system, worked to the detriment of the medical administration and the care of the sick. During the changes, which were frequently occurring among troops, companies leaving pueblos and replaced by others of different regiments would not only rob the camp hospitals of the personnel, but also dismantle them and carry off all the supplies and equipment. In order to break up this system, I requested the department commander to issue an order to the effect that during such changes the hospital personnel and equipment be left undisturbed, except when authorized to do otherwise by instructions from department headquarters.

Regimental and camp hospitals.—In addition to the regimental hospital organized at the headquarters of the regiment, it became necessary to organize a small hospital for the use of each separate station, except in the case of very small detachments. Medical officers were directed to organize such temporary hospitals in nipa houses or other buildings conveniently located, after a thorough cleansing and disinfection. From 5 to 10 field cots were issued for this purpose, and in many instances these hospitals were equipped with native beds and furniture. In every pueblo suitable buildings were found large enough to accommodate 50 beds if necessary. For all patients in such hospitals a gratuity of 30 cents, Mexican, was allowed from the civil fund in addition to the ration. Medical officers were directed to transfer all serious cases from the regimental and camp hospitals to the permanent field and base hospitals established within the division. Typhoid and malarial fevers, chronic dysentery, chronic diarrhea, and surgical cases requiring special skill were included in this list. Before these camp hospitals were established a large number of all the cases appearing on sick report were sent to the division hospitals or to Manila, and, consequently,

many of these large hospitals were overcrowded with mild cases. These camp hospitals also reduced very greatly the percentage of sickness in the division. A large number of the cases were really not serious enough for transfer to the permanent hospitals, a rest of a few days in camp hospitals on a proper diet being all that was necessary in such cases. It is believed that men sent to Manila, or the permanent hospitals, remained on sick report much longer than necessary in many instances, and in this way kept up the percentage of sick.

Field and base hospitals.—The division hospital was established in the cathedral at Angeles by First Lieut. P. C. Fauntleroy, assistant surgeon, United States Army, September 29, 1899, and has a capacity of 260 beds. The main floor of the church is divided into four aisles, each of which has been converted into a ward. This hospital receives patients from troops stationed south of Angeles, and generally contains from 140 to 160 cases. The pueblo of Angeles is located in a sandy country about 90 feet above the level of the sea and is regarded as a very healthy section of the country. It is located on the railroad running from Manila to Dagupan and is thus favorably situated for the transportation of the sick. The nursing in the hospital is entirely done by members of the hospital corps, which has proven as satisfactory as in other hospitals employing trained female nurses. Lieutenant Fauntleroy is a very capable and painstaking officer, and possesses a high order of executive ability. He deserves great credit for the successful manner in which he has administered this hospital. In addition to his duties with the division hospital, he also is medical supply officer of the department, the depot being located at present in Angeles. Since the department headquarters were removed to Manila, orders have been issued transferring the depot here.

Base hospital, Dagupan.—As a result of General Wheaton's expedition north and campaign through the province of Pangasinan, it became necessary to establish a base hospital at Dagupan. A large building constructed by the Dominican Friars and used for college purposes, was selected for this purpose. This building is located on a tongue of land surrounded on one side by an arm of the sea and the other by a series of salt beds flooded by the ocean and is admirably arranged for hospital purposes. It has a capacity for 375 patients, besides rooms for dispensary offices, stores, diet kitchens, and a large corridor for mess hall. The hospital was established during the month of December, 1899, but was not thoroughly equipped before the 1st of February, 1900. The locality of this hospital makes it a very valuable place for the treatment of malarial and intestinal affections.

Brigade hospitals.—In addition to the division and base hospitals, a hospital for the First Brigade had been established at Tarlac, and one for the Third Brigade at San Isidro. On joining the division I found the First Brigade hospital had degenerated into a regimental hospital for the Ninth Infantry. On an inspection tour made to Tarlac, January 2, I found 49 patients in this hospital, 47 of whom belonged to the Ninth Infantry stationed in that and neighboring pueblos. This hospital was continued as the regimental hospital of the Ninth Infantry; the building which it occupied, the pueblo Presidencia, was well suited for hospital purposes, and was capable of accommodating 80 beds. The Third Brigade hospital at San Isidro, now officially known as the Fourth District hospital, occupies a large building in the center of the town and has a capacity of 75 beds. This hospital was originally established by General Lawton for the First Division during his expedition through Baliuag. At present it serves an excellent purpose for use of troops in San Isidro and those stationed in towns along the Rio Grande de Pampanga.

Division supply depot.—Until February requisitions for medical and hospital supplies were sent direct from regimental surgeons to the chief surgeon of the corps for issue from Manila. About this time so much work had accumulated on the hands of the supply officer in Manila that it became impossible to have requisitions filled with the necessary dispatch in cases of emergency. With the consent of Colonel Greenleaf, I established a medical supply depot for the division in the convent adjoining the division hospital at Angeles. Lieutenant Fauntleroy, the commanding officer of the hospital, was placed in charge. The building selected contained a number of rooms on the ground floor which rendered it specially suitable for depot purposes. Ample requisitions were made on the main depot in Manila, and from about the middle of February the medical officers of the division were supplied from Angeles. Regimental surgeons were directed to forward their requisitions for supplies for the entire regiment quarterly, except when it became necessary to submit specials; they were also authorized to use the wire when necessary. Regimental surgeons, when practicable, drew and issued supplies to the other posts of the regiment, and carried the nonexpendable property on their papers. Owing to the location of portions of the regiment this method could not be carried out, and the medical officers in charge of such troops were authorized to submit their own requisitions. Under these circumstances the medical officers drawing such supplies became responsible for them, it being

impossible for the regimental surgeon to do so. On account of the press of work in the medical supply depot at Manila, the chief surgeon of the corps did not require medical officers receiving supplies to receipt for the expendable articles. This reduced the clerical work very materially. This same system was carried out in the division supply depot. Owing to the regimental system of receipting for medical supplies, Lieutenant Fauntleroy experienced considerable difficulty in obtaining receipts for supplies issued direct to medical officers serving with companies detached from regimental headquarters, and it became necessary to issue a circular on this subject. The medical officer receiving such property was required to send a memorandum receipt of it to the regimental surgeon, and in that way the matter was arranged. Since the department headquarters have been removed to Manila, steps have been taken to remove the department supply depot here also. Owing to the enormous seacoast occupied by troops of this department, and the water transportation necessary, Angeles is no longer a suitable place for this depot.

Division ambulance company.—An ambulance company had been organized for the division during the fall and before the command had begun its campaign north. This company was made up of 6 ambulances, a number of caraboa carts, litters, and a hospital personnel of 1 hospital steward, 2 acting stewards, and 40 privates. The company was under command of Acting Asst. Surg. A. B. Smith, and stationed at Tarlac when I joined the division. I understand it did excellent service in removing the sick and wounded along the line of march during the fall campaign. As there was no further use for such an organization, the troops being divided into one and two company garrisons, this company was disbanded early in January, the ambulances, personnel, etc., being assigned elsewhere.

Buildings occupied by troops, camp sanitation, etc.—Owing to the hostile condition of the country and the facilities offered for harboring insurrectos, ladrones, etc., the division commander decided to garrison all the principal pueblos in the limits of the division; hence each regiment was required to cover from six to twelve stations. The majority of the pueblos contain a church and convent, and this property as a rule was taken for the use of the troops, the friars having left the country during the insurrection. Private residences constructed of hard wood or nipa houses were occupied in towns where convents did not exist, and as a rule the troops were well and comfortably housed. A suitable building was also selected for the camp hospital. The sanitation of the towns was extremely bad when our troops entered them. The habitations of the natives as a rule were surrounded by filth of all kinds—slops, garbage, fecal accumulations, rubbish, and other débris. Weeds and rank vegetation were allowed to grow along the fences, in the yards, and in the streets. The native privy consists of a small bamboo house, erected about 5 feet from the ground and located in the yard, and connected with the main house by a bamboo bridge. The deposits as they drop are disposed of by the Filipino hog, the scavenger of the island, who usually remains around during the morning hours. Where this arrangement does not exist, the fecal matter is deposited amongst the weeds in the vicinity of the house. The slops and garbage as a rule were thrown to the hogs outside of the door or beneath the house through the open bamboo floor. Each family generally possesses a well, located near the kitchen door and not over 5 or 10 feet deep, the exception being to find them walled. Smallpox was prevalent in nearly every pueblo in the division, and it is questionable whether any house could be found which was not more or less infected. No attempt was made at isolation or disinfection by the natives, and the funerals of those dying of the disease were public in every sense from house to church and cemetery. Under these circumstances it became necessary to take unusual precautions with our troops. Stringent orders in regard to the boiling and filtering of drinking water, disposal of garbage and night soil were issued by the division commander. Post commanders were required to consult with the town presidents and counselors in regard to the sanitary conditions of the towns, and a great reformation was accomplished in this direction. As soon as possible the dry-earth system was introduced throughout the division, the closets being supplied by the quartermaster's department.

Smallpox and public vaccination.—Owing to the prevalence of this disease the following letter was written to the division commander, which resulted in an order for the public vaccination of natives within the limits of the division:

HEADQUARTERS SECOND DIVISION EIGHTH ARMY CORPS,
CHIEF SURGEON'S OFFICE,
Bautista, P. I., February 30, 1900.

SIR: I have the honor to state that smallpox is more or less prevalent in every town within the limits of this division, and not rare among our troops as a consequence. I do not believe it possible to stamp out this disease among our soldiers, in spite of the frequent and careful vaccinations practiced among them, until the natives

are themselves protected. Owing to the continuous state of warfare that has existed on these islands for some years past, systematic vaccinations have been neglected among the natives, and hence the prevalency of this disease. Medical officers stationed in many of these towns report serious epidemics of this disease, and have been supplied with virus for use among natives in small quantities. While many officers are willing to perform this additional duty, not only for the protection of the men under their charge, but also from motives of humanity, it would seem wise for the military authorities to take this matter under consideration without delay. The natives in many instances are anxious for vaccination and frequently apply to medical officers along the line of railroad and also from interior towns. A systematic and compulsory system of vaccination should be required as far as it is possible within the territory now under our control. It is also believed that arrangements could be made to have these vaccinations performed all over the islands. When the work can not be performed under the direction of the medical officers, in towns where troops are stationed, the services of practicantes can be secured for from $15 to $25, Mexican, per month. The virus and expense of vaccination should be charged to the United States or to civil funds.

L. M. MAUS,
Major and Surgeon, U. S. Army, Chief Surgeon.

THE ADJUTANT-GENERAL SECOND DIVISION, EIGHTH ARMY CORPS.

This communication received the hearty approval of General MacArthur, the division commander, and the chief surgeon of the corps. I was directed by the corps commander to institute as quickly as possible a system for the protection of the natives of the division, which was to be paid for out of the civil funds. Although our men had been frequently vaccinated, numerous cases of smallpox were reported from day to day among them, and not infrequently a number of deaths. It is my opinion that before the public vaccinations were instituted as many as forty or fifty cases of smallpox were being daily treated in the division among the troops, while in some of the towns the disease was practically epidemic among the natives and deaths very common. Circular letters of instruction were written to brigade surgeons, as well as to medical officers, in regard to the matter of procedure, etc. They were authorized to hire native vaccinators at $30 Mexican per month and inspectors at the rate of $40. No limit was placed on the number of vaccinators for each pueblo, this depending on the amount of work required. Virus was furnished in abundance on telegraphic requisitions to the board of health, Manila. The following circular was sent February 17, 1900, to all medical officers in the division:

"1. Medical officers on duty in this division are directed to superintend the vaccination of natives in towns where troops are stationed, and are also expected to exercise control over towns and barrios in their respective neighborhoods. They will confer with the city authorities in the regard to the selection of a suitable place for these vaccinations and best method for gathering the inhabitants together for this purpose. Medical officers are specially cautioned in regard to proper instructions for cleansing arms, instruments, and performing the operations. Soap, nailbrushes, bichloride tablets, gauze, and blank books should be provided vaccinators. These articles can be secured from Manila on properly prepared requisitions, the cost of which is defrayed by the civil fund. Before vaccination the arm should be thoroughly washed with soap and scrubbed with a nailbrush, afterwards rinsed in boiling water. In case an antiseptic solution is used, care should be observed that it is carefully washed off before the operation. The arm should be left uncovered at least thirty minutes after vaccination, until it becomes dry and glazed over. The process of vaccination of large numbers may be greatly facilitated by systematizing the work—that is, assigning a certain portion of the work to each individual; for instance, one for washing arms, a second for preparing the spot for vaccination, and a third for inserting the lymph. A fourth person should be employed for keeping the records of those vaccinated. A record of every case will be kept and records forwarded to this office after completion of work."

The vaccinators were paid on rolls forwarded to the division supply officer, who had charge of the disbursement of the civil funds for vaccination and purchase of drugs for indigent natives. In order to lend official sanction to this work and secure the cooperation of the commanding officers in the various pueblos, the following order was issued from division headquarters:

GENERAL ORDERS, }
No. 15. }

HEADQUARTERS SECOND DIVISION
EIGHTH ARMY CORPS,
Bautista, P. I., February 17, 1900.

1. The work of vaccinating the native population within the limits of this division being now in progress under the supervision of the chief surgeon, commanding officers

will cooperate with the medical department and render all assistance possible in the prosecution of the work.

By command of Major-General MacArthur:

BENJAMIN ALVORD,
Assistant Adjutant-General.

The work of public vaccinations was fairly started February 20 and was industriously pushed by the medical officers in charge. The board of health, Manila, usually kept an abundance of fresh virus on hand and responded promptly to requisitions for it. There was very little objection on the part of the natives, probably no more than would have occurred among the same number of Americans. The insurgents objected to these public vaccinations in several of the pueblos, manifesting their disapproval by kidnapping the vaccinators.

District surgeons are required to render a report of work done in their respective districts after the completion of the work. The work is still going on, but the following reports show what was accomplished in each district from February 20 until May 31.

The first and second districts were not attached to the division until it was merged into a department in April, and owing to the poor mail facilities and uncertain transportation of virus little was accomplished in these districts before I was relieved as chief surgeon. Much of the virus sent to them became inert before it reached its destination.

	Third district.	Fourth district.	Fifth district.
Estimated population	337,363	121,400	330,612
Estimated number protected by smallpox	171,788	25,718	78,069
Estimated number protected by previous vaccinations	13,853	12,177	109,112
Children vaccinated	62,609	19,224	31,173
Adults vaccinated	41,301	14,851	27,222
Successful vaccinations	72,291	15,055	20,216
Total vaccinations	114,051	34,075	58,253
Number that require vaccination	50,635	68,450	113,796
Number of vaccinators employed	127	31	68
Number of units virus used	152,700	31,000	42,000

Hospital cars.—As the army advanced north the Manila and Dagupan Railroad was rehabilitated, and proved invaluable not only for the transportation of troops and supplies, but for the sick and wounded of the division as well. Ordinary freight cars provided with mattresses, blankets, pillows, etc., were first utilized for this purpose, but upon proper representation to the corps commander authority was obtained to fit up two long freight cars for hospital purposes. The division hospital was located at Angeles, 50 miles north of Manila, and all patients south of that point were sent to the division hospital. The base hospital at Dagupan, 70 miles farther north, received all patients north of Angeles. The hospital cars were fitted up with eight superimposed woven-wire bottom berths, racks for medical and surgical supplies, ice box for preserving milk and other foods, and a water-closet. Each car was provided with one acting steward and two privates, one of whom was a supernumerary. These cars made daily trips between Manila and Dagupan and served a most useful purpose. The following letter was embodied in an order by the department commander and issued as hospital car regulations:

HEADQUARTERS SECOND DIVISION EIGHTH ARMY CORPS,
CHIEF SURGEON'S OFFICE,
Bautista, P. I., April 18, 1900.

SIR: In order to more properly organize the hospital railway service for this department, I have the honor to recommend that a circular letter of instruction embodying the following rules and regulations be published for the information and guidance of all concerned:

1. The railway service in connection with the transportation of the sick and wounded will be under charge of the chief surgeon of the department and subject to his instructions.

2. The personnel of each hospital car will consist of one acting hospital steward and two privates of the hospital corps, one of whom shall be a supernumerary. They will be attached to the department hospital at Angeles for muster, pay, clothing, etc., and will be carried on the rolls of that hospital. When relieved from temporary or permanent duty with the hospital car service they will report to the commanding officer there for duty.

3. The acting hospital steward, or senior private, present in charge will be held responsible for the proper administration of this service and the care of the sick during transfer to their destination. He will keep a daily report, in a blank book provided for this purpose, of every one transferred, stating name, rank, company, regiment, corps, diagnosis, and place of destination. Where casuals are transferred without transfer slips, the cause, as far as possible, will be noted in the report. A copy of this report of each day will be transmitted to the chief surgeon of the department.

4. A daily inspection of the hospital car service will be made by a medical officer belonging to the staff of the department hospital at Angeles, under the directions of the commanding officer. He will examine into the condition of the service, see that the medical supplies and equipment of each car are properly maintained, report necessary repairs to cars, and make such recommendations as may be necessary for changes in the personnel.

5. No person will be permitted to travel on the hospital cars except the attendants and the authorized sick. Officers or soldiers taken sick en route, or found along the line, should be transferred in hospital cars, though having no transfer slips. The name of any officer, soldier, or citizen violating this regulation will be reported to the chief surgeon of the department.

6. Except medical supplies in small quantities for emergency use, and ice for hospitals, no articles will be shipped in hospital cars.

L. M. MAUS,
Major and Surgeon, U. S. Army, Chief Surgeon.

The ADJUTANT-GENERAL, SECOND DIVISION EIGHTH ARMY CORPS.

Public distribution of medicines to indigent natives—free dispensaries.—As a result of the recent wars, a large proportion of the natives had become impoverished, run down in health, and greatly in need of medicines. Practically no practitioners of medicine could be found in the country, and very few drug stores. Pernicious malarial fever was not uncommon among them, and deaths from that cause not infrequent. The only quinine available in the country was that supplied to the troops. In the pueblo of Mexico, province of Pampanga, twelve natives died from pernicious malarial fever in one week. Fifty ounces of quinine were sent there for distribution in charge of a medical officer, and the medicine dispensed on the main plaza. The judicious use of this medicine, together with a thorough overhauling of the sanitary condition of the city, relieved the situation. The condition of the people in this respect was represented to the division commander, and $20,000 Mexican requested to purchase medicines for the indigent poor. The application was approved and the money was turned over to the division supply officer. A supply of quinine, vaseline, carbolic acid, gauze bandages, bismuth, etc., was sent to sixty-six pueblos, and by these means great good was accomplished.

Prevailing diseases.—Malarial fever and intestinal diseases comprise about 60 per cent of all the diseases occurring on the island of Luzon. The malarial parasite is probably responsible for at least one-half of all the sickness, while next in order are diarrhea and gastric disorders. Dysentery is also common, but not so frequent as diarrhea; perhaps 25 per cent of the dysenteries are of the amœbic variety. Dhobie itch (tinea circinata) is not as common as generally supposed. Smallpox is very common among the natives, and while quite fatal, appears not to be dreaded. I think that 50 per cent of the living population have had the disease. Leprosy is widely scattered over the archipelago, an estimate of 30,000 cases having been made on good statistical authority. Beriberi is frequent during the rainy season. Catarrhal diseases are also quite common, especially chronic inflammation of the nose, throat, and bronchial tubes. Pulmonary tuberculosis is also a widespread disease among the natives.

The large percentage of malarial fevers and intestinal diseases contracted by the troops was due to numerous "hikes" after insurrectos and ladrones under the most unfavorable hygienic conditions. While on these trips the men waded through swamps and flooded rice fields, drank water from all sources, ate poorly prepared food, and slept in wet clothes. They were also exposed at times to the sun's rays during the heat of the day. These conditions will in all probability not occur again, and if so, will be confined to only a small per cent of the troops, hence the general average of the mens' health should be better in the future. From my experience with troops that have been stationed here under favorable conditions, and with good hygienic surroundings, I am satisfied that a high standard of health can be maintained among them. During the acclimatizing process everyone is liable to lose his superfluous flesh, but that is rather an advantage. When proper barracks and living facilities are prepared in the Philippines for our troops and their duty is confined to

garrison life, I feel quite sure that the sick rate will be no higher than at stations in the southern part of the United States.

Rations.—The Government ration as issued by the Subsistence Department appears to be adequate and well adapted for the needs of our troops in the Tropics. Much has been written on this subject, and by many of these theoretical writers a dietary prescribed similar to that in use by the inhabitants of the country. In the discussion of this question several important factors must be considered. First, that the physical condition of the American soldier differs in every respect from that of the Filipino, Cuban, or Porto Rican, and consequently his physical wants are equally different. Four centuries have cultivated a taste in the Filipino for rice and the omnipresent mud fish; time has so molded the palate of the Mexican that he craves and digests with ease tortillas, frijoles, and chili, while the Cubans and Porto Ricans are wedded to their food—yams, rice, etc. The stomachs of these various races are accustomed to the food they have received for generations and readily take care of it. Put an American on the diet of any of these tropical countries, and in less than a week his stomach will be gone. Our ration is excellent and in the main should be left undisturbed. Some slight changes might be made in regard to the reduction of the fats and increase of the saccharin element. The fresh beef and mutton sent here as a rule comes from Australia, and is issued to the troops in the interior hundreds of miles from Manila in a semifrozen condition. It is always received in an excellent condition and is of a fine quality. Cocoa, chocolate, and tea are adapted to the Tropics, and the men crave sweets, such as jams, preserves, dried fruit, and candy. Sugar promotes health if taken in reasonable quantities, and creates vital energy. Great stress should be laid on the preparation of food, and each company should be supplied with two accomplished cooks.

Clothing for the troops in the Tropics.—As the change in temperature during the year undergoes slight variation, no change in weight or texture should be made in the clothing for the different seasons. The material employed in the manufacture of the blouse, trousers, and underwear should consist of cotton, linen, or a mixture of the two, and of a light texture. Lightness, strength, durability, and color are the four requisites in the manufacture of a uniform for the Tropics. Woolen garments, pure or mixed, may be regarded as unnecessary in a climate where the temperature rarely goes lower than 75° F. during the coldest season of the year. Wool is rarely worn here either by natives or acclimated foreigners. The khaki cloth issued by the Quartermaster's Department is too heavy and dense for comfort. It is woven into a heavy drilling which entirely precludes the passage of air. The felt hat is also too heavy for comfort and should be superseded by straw. The drab felt hat, as now manufactured, retains too much heat and prevents the necessary circulation of air around the temples. Canvas-top shoes, with leather soles and heels, would be an improvement over the leather in the dry season. Rubber boots would be serviceable for guards, etc., during the rainy season, and a mackintosh in place of a poncho. A reform in the color of the tropical uniform is one of the most desired changes. A composite shade of green would be infinitely better in every respect. This color, from a military standpoint, is superior to the khaki of the English, which we have adopted, or the blue and white of the Spaniards. Such a shade of green would absorb less heat and would certainly be less conspicuous on the firing line. The shade desired is obtained by blending green with a russet brown. The material might be woven of an alternate green and russet brown thread, or a composite shade made up by a blend of the two. The entire islands are covered with a dense vegetation at all seasons of the year, consisting of palms, bamboo, banana shrubs, grass, and dense hedges with every variety of green shades. Protective mimicry in nature among birds and animals is so well known by natural historians that it is scarcely necessary to discuss it here, but a valuable suggestion lies behind this truth, which if acted upon would no doubt work to the material advantage, comfort, and safety of our troops. In addition to the natural advantages already mentioned in connection with this subject, it would not be amiss to state that such a shade of green would prove exceedingly handsome and agreeable to the eye, and by its adoption would possess the sentimental attractiveness of being a national uniform color, which the khaki can never possess, from the fact that it is essentially English, and should be left to their quiet and undisturbed possession.

Monthly medical reports, clerical work, etc.—Great difficulty was experienced in securing the monthly official reports on account of the inexperience of medical officers and the scarcity of experienced hospital and acting stewards. Very little was expected of these officers under the circumstances, and the tardy appearance of the incorrect reports which were finally received caused no surprise in my office. Except in the case of one officer, every report of sick and wounded had to be returned for corrections. It became impossible for the regimental surgeons to render a report for the

entire regiment on account of the widely separated companies. Each camp surgeon was required to render the monthly report for the troops he attended, and as he in numerous cases had charge of three or four stations, some of which he could not visit oftener than once a week, he had to make up some of these reports from data and information furnished by the hospital private in charge. The following is a copy of the usual daily report furnished the department commander, a copy of which was also sent to the corps surgeon:

Daily field report of sick and wounded, Department of Northern Luzon.

Organization.	Strength reported.	In quarters.	In hospital.	Absent.
Engineer Corps	Detachment	[1]	[1]	[1]
Third Cavalry	8 troops	42	38	4
Fourth Cavalry	6 troops	30	17	62
First Artillery	1 battery	3	0	15
Third Infantry	Regiment	40	20	51
Ninth Infantry	do	41	14	138
Twelfth Infantry	do	33	24	105
Thirteenth Infantry	do	30	23	95
Sixteenth Infantry	do	40	66	54
Seventeenth Infantry	do	26	23	104
Twenty-second Infantry	do	48	10	101
Twenty-fourth Infantry	4 companies	16	10	22
Twenty-fifth Infantry	Regiment	26	25	43
Twenty-seventh Infantry	do	56	21	66
Twenty-ninth Infantry	5 companies	16	0	73
Thirty-second Infantry	Regiment	30	20	83
Thirty-third Infantry	do	34	61	13
Thirty-fourth Infantry	8 companies	28	22	12
Thirty-fifth Infantry	Regiment	26	40	51
Thirty-sixth Infantry	do	24	34	24
Forty-first Infantry	do	34	42	31
Forty-second Infantry	do	19	7	114
Forty-eighth Infantry	1 company	5	10	7
Forty-ninth Infantry	3 companies	8	10	0
Macabebe scouts		5	0	1
Native scouts		5	6	3
Burr's scouts		1	3	0
Total		666	546	1,272

[1] No report received.

Department field hospital, Angeles	134
Department base hospital, Dagupan	264
Fourth district field hospital, San Isidro	54
	452

Deaths: Private Clarence Quillion, Company E, Thirty-fifth Infantry, gunshot wound, abdomen. Private Lewis F. King, Company E, Thirteenth Infantry, sunstroke.

Special mention of medical officers and members of the hospital corps for gallantry during action or for meritorious service.—I have no special official information concerning the gallant conduct of many of the medical officers of the division during the preceding summer and fall. Many of them were present during numerous sharp engagements and performed conspicuously gallant service in the relief of the wounded on the firing line. I understand that these officers have been specially mentioned by their respective commanding officers. Maj. Franklin A. Meacham, surgeon, United States Volunteers, deserves special mention for the zeal, energy, and ability displayed in the administration of his brigade and district. First Lieut. P. C. Fauntleroy, assistant surgeon, United States Army, deserves great credit for the successful administration of the Second Division Hospital and supply depot. The following letter was received from Maj. G. W. Penrose, brigade surgeon, United States Volunteers, in regard to Acting Assistant Surgeon Reifsnyder, dated January 18, 1900:

"I have the honor to make the following report: As I wired you yesterday, Acting Assistant Surgeon Reifsnyder reported here with 49 sick of the Twenty-second Infantry en route to San Fernando. This officer has been steadily in the field since last October, he has been cut off from all supplies, has had to subsist his sick on the country and trust to native leaves and roots for medicines. All his sick had to be carried in hammocks by natives. In spite of every difficulty he brought them through in splendid shape. Most all of the men will be ready for duty in a few days. I most strictly commend the zeal and professional ability of this officer to the attention of the chief surgeon, believing him worthy of special mention."

Acting Hospital Steward Frederick W. Boschen for gallantry and efficiency in the performance of his duties during the battles at Bagbag, San Fernando, Angeles, Bamban, and other engagements during the march of the division north; also for his clerical work as chief clerk to the chief surgeon of the division. Acting Hospital Steward William Vogt for gallantry and efficiency in the performance of duty during the actions at Taytay, Paranaque, San Fernando, Angeles, Bamban, and for his clerical ability in the office of the chief surgeon of the division. Acting Hospital Steward Angus Peete for his efficient clerical work in the office of the chief surgeon of the division. I invite attention to the list given by the chief surgeon of the Fifth district in his report. (See p. 146.)

On my assignment to the division as chief surgeon December 21, 1900, it contained 17,766 officers and enlisted men, 91 posts and 51 medical officers, 16 hospital stewards (regular and volunteer), 15 acting hospital stewards, and 261 privates. When relieved, June 8, 1900, the department contained 25,550 officers and enlisted men, 226 posts, 124 medical officers, 30 hospital stewards (regular and volunteer), 65 acting hospital stewards, and 762 privates of the hospital corps.

REPORT OF LIEUT. P. C. FAUNTLEROY, ASSISTANT SURGEON, UNITED STATES ARMY, ON THE SECOND DIVISION HOSPITAL AT ANGELES, PAMPANGA, LUZON, MADE JUNE 1, 1900, TO THE CHIEF SURGEON, DEPARTMENT OF NORTHERN LUZON.

In compliance with instructions in letter, chief surgeon's office, Department of Northern Luzon, dated Bautista, P. I., May 4, 1900, I have the honor to submit the following report, accompanied by photographs of this hospital, from January 1, 1900, to May 31, 1900:

The hospital, since September 29, 1899, has been located in the cathedral and its adjoining buildings at Angeles, P. I. The cathedral is built in a large open square, fronting on a road running east and west, and situated on the southern boundary of the town, about 1¼ miles south of the railroad depot. The walls and belfry towers are built of artificial stone. The roof, together with the large dome situated on the rear end, is of corrugated iron. The interior is about 100 feet wide and 200 feet in length, divided into three aisles by a row of large pillars on either side of the center aisle, which is about 50 feet in width. The altar is about 4 feet above and occupies the last 30 feet of the main floor, extending the entire width of the interior. In rear of the altar is a large vestry with two adjoining rooms. The floor of the main entrance, side aisles, altar, vestry, and all rooms is of tiling; that of the center aisle is of hard wood. The ceiling of the center aisle is an arch of redwood springing from the top of the large pillars, which are about 25 feet high, and rising to a height of 40 feet above the floor. The interior is always cool in the hottest weather, and very dry in the wet season. The dispensary is located in one of the rooms on either side of the main entrance; the officer of the day occupies the other. The aisles form the medical wards Nos. 1, 2, and 3, respectively; the altar, the surgical ward, together with a small ward for officers; the capacity of each of the wards being about 65 beds. The vestry was utilized for the main operating room, one of the side rooms being used for minor surgery and dressing room. The location and size of the operating room permitted the wounded, during the active operations of the Army and at other times for cases requiring surgical operations, to be brought in and operated on without disturbing the other patients—a very important feature when there were many wounded to be cared for at the same time. An isolation ward of bamboo was built 100 yards to the west and rear of the cathedral. Running east and west about 30 feet from the cathedral is a thick hedge of very tall bamboo which affords shade and protection from the winds continually blowing over the wet rice and cane fields on the other side of the bamboo. On the east side the laundry, stable, and patients' rear are located; on the south, behind the bamboo hedge, the rears for officers and hospital corps, respectively, and on the west the mess halls for patients and hospital corps, the kitchen and bath houses. In the large house extending the front of the cathedral to the west there were sleeping apartments and numerous rooms, which furnished quarters for the medical staff and part of the hospital corps. The rooms on the ground floor were used for subsistence store rooms, record office, and medical supply depot for the Department of Northern Luzon. On the west side of this house two acres were fenced in and the hospital garden planted.

Administration.—The commanding officer, there being no executive officer, performed the duties of the latter together with those purely his own. The combining of these two offices being necessary, as no assistant surgeon was available for detail as executive officer. To each ward there was detailed an acting assistant surgeon as ward surgeon, and six privates of the hospital corps, one of whom was assigned as wardmaster, three as day nurses, and two as night nurses; special nurses being

assigned when cases required such attention. To the surgical ward two competent privates were assigned to duty in the operating room and surgery. The work of the dispensary was performed by two privates, one of whom, Theodore C. Eppelin, was a graduate of pharmacy. The prescription work of the hospital, and that of a light battery whose sick call was held by one of the surgeons on duty at this hospltal, was the work expected of the dispensary. The steward in charge of the medical supply depot having also the property of the hospital in charge, the ward masters obtained their supplies, other than medicines, from him at the hospital storeroom. The kitchen was equipped with two army ranges and a field range. In May, 1900, a bake oven was built. As no other range could be obtained or competent cooks be found in the hospital corps, the preparation of the food for all was done in one kitchen.

Food.—The credit of 40 cents per patient per day was found amply sufficient to purchase an abundance of what the subsistence department kept on hand, and in addition all the eggs, chickens, and vegetables which the country afforded. Capt. Harlow M. Street, commissary, United States Volunteers, depot sales commissary, deserves great credit for his uniform courtesy and energy in meeting every requirement of this hospital. At irregular times natives could by hard work gather around Macabebe, P. I., a few days' supply of tomatoes and radishes for the hospital, but the lack of anything like truck gardens on the island prevented the regular supply of fresh vegetables in sufficient quantities. The supply of canned vegetables kept by the commissary met this want as well as could be done by canned food. The malted milk, condensed milk, and evaporated cream, together with canned soups, furnished the greater part of the liquid diet necessary. Farina, rolled oats, cornstarch, tapioca, rice, tomatoes, gelatin, soup, eggs, crackers, fresh meat, and soft bread furnished the light diets. The fine quality of refrigerated fresh meat furnished, together with potatoes, peas, beans, corn, rice, tomatoes, onions, prunes, coffee, and soft bread furnished the heavy diets. A garden was started during the first half of April, and we have an abundance of onions and radishes and lettuce now. This garden has been increased and in time will afford an abundant supply of fresh vegetables, such as onions, radishes, lettuce, spinach, cabbage, and beets.

Water supply.—Prior to the middle of April a small quantity of artesian well water was obtained by the railway train from San Fernando, P. I., and the remaining quantity necessary was obtained by boiling the water from a previously-cleaned native well. After that date the water from the native well was sterilized by a Waterhouse-Forbes sterilizer, which afforded an abundant supply of pure and palatable water. About 150 pounds of ice being all that could be obtained from Manila, P. I., the need for more was often felt.

Medical supplies.—Medical supplies were obtained from the medical supply depot in Manila, P. I. They were often tardy in arriving, but as far as the essential medicines were concerned they usually were sufficient, and many articles to be considered as luxuries were furnished. The medical supply depot for the Department of Northern Luzon has been in charge of the commanding officer of this hospital. The medical supplies for the indigent natives for the Department of Northern Luzon were bought and distributed by this supply depot. The medicines for this purpose ordered cost $20,000, Mexican coinage, and will be distributed among 67 towns. The funds for the payment of the native vaccinators employed to vaccinate the natives in this department were disbursed from this depot. The cost of this work to date is about $4,500, Mexican coinage.

Sanitation.—The dry-earth system, using galvanized iron receptacles, is used. The contents of receptacles from rears, together with garbage, slops, and other refuse from kitchen, mess halls, wards, etc., are hauled away twice a day on native carabao carts about 800 yards from the hospital and buried 3 feet below the surface of the ground, the receptacles being thoroughly washed before they are used again. This system has been in operation at this place for seven months and has proved satisfactory in every way. One carabao cart, 5 Chinos, and 5 natives under a competent private of the hospital corps have performed this work, together with other police work necessary to keep the surroundings of the hospital clean. The complete separation of the kitchen and mess halls from the rears is a feature which is preventive of the spread of any infection from the latter. The hospital corps, besides doing the nursing, keep the wards and interior of the hospital clean. Cleanliness of bedpans, urinals, etc., together with a liberal use of crude carbolic acid in disinfecting them, has done much to prevent the spread of any infection. The laundry work has been done at this hospital by 5 natives, in charge of a competent private of the hospital corps. All clothing, bedding, etc., has been soaked for twelve hours in an acid bichloride of mercury solution, 1:1000, then boiled in a weak alkaline water and afterwards thoroughly washed. To this daily routine is to be attributed the

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freedom in the hospital from the spread of skin diseases, such as pemphigus contagiosus, tinea circinata, and other diseases, notably smallpox and typhoid fever.

Malarial infections.—The percentage of admissions from this cause was 48.26. The disease was usually of the irregular type, due to the æstivo autumnal and tertian organisms. The frequency of diarrhea as a complication or sequel was marked, and its persistency in many cases will explain the loss of so many days in the hospital by cases admitted for a malarial infection, which is not usually of a severe type. The judicious administration of quinine in solution by the rectum has never failed to terminate an attack. One gram sulphate of quinine thus administered at twelve hours' intervals has proved adequate for the severest cases; in the milder cases, 325 milligrams thrice daily was found sufficient. On admission, cases with high temperature from this or any other cause were given tub baths. In this disease, as in all others among soldiers here, it will be found particularly conducive to a rapid recovery to correct in the early stage any bowel disorder; and to this end fractional doses of calomel or a moderate dose of castor oil will be found to be indicated in the majority of cases. The hypodermic administration of quinine is particularly recommended for the rapidity and certainty with which it kills the organism in the blood; but the administration by the rectum will be found for these cases more satisfactory from its adequacy and its freedom from local irritations and abscesses often following the hypodermic method. In connection with the administration of quinine, it is to be noted, from the frequency of injudicious administration, that the persistent use for days of large doses is to be condemned without reserve, as such overdosing has been the cause of many cases of temporary mental derangement and a far greater number of a less pronounced type of nervous disorder, which retards convalescence in all cases and in the majority precludes the likelihood of complete restoration to duty in this climate. Fowler's solution of arsenic and tincture of the chloride of iron are valuable in the anæmia consequent on this disease.

Diarrhea has been the cause of 5.44 per cent of the admissions. Exposure to extreme heat in the dry season and to moisture and chill in the wet season, together with irregularities in eating, are the causes which produce diarrhea in the soldier here. These he can not avoid, in many instances, in the performance of his duty. Debility supervenes in the severe cases of diarrhea, hence the importance of rest and the early stopping of all food for twenty-four hours with a subsequent liquid diet for such cases. Such a course will do much to quiet an irritated bowel, hasten relief, and lessen the number of chronic intestinal disorders of this nature. If, together with this care, the bowel is thoroughly washed out with hot salt enemata, followed by a starch and opium enema, the majority of cases will be found to require little or no medication by the mouth. Anæmia and emaciation are marked features in prolonged cases of this disorder, and require iron and a general tonic treatment. Just now there are many of these chronic cases, incident to the recent campaign, which have reached a stage of anæmia, emaciation, and general debility that nothing short of a sea voyage to the colder climate of the United States will restore to health.

Dysentery has been the cause of 4.56 per cent of the admissions. The amœba would seem not to be a frequent cause of dysentery here—most of the cases being grafted on conditions malarial in origin. Cleansing enemata, followed by sedatives with small doses of ipecacuanha combined with salol and opium, have proved very efficient in these cases. When the system has been much depleted, hot saline enemata twice daily, to be retained, will be found very grateful to the patient and restorative. In all jaundiced conditions these hot saline enemata will be found valuable in correcting a stagnant hepatic circulation.

Skin diseases have caused 0.32 per cent of the admissions. The wide spread of tinea circinata, so-called dhobie itch, calls for the mention of a remedy, liquor calcis sulphuratæ, which has proved peculiarly curative in this disease. I took this suggestion from "Manson's Tropical Diseases" nine months ago and have never seen a case that it failed to cure. Considering the widespread nature of this disease, the cheapness and simplicity of preparation of the remedy are features that recommend its use aside from its effectiveness.

Typhoid fever has caused 0.28 per cent of the admissions—a comparatively small percentage.

MEDICAL OFFICERS.

The medical staff consisted of one first lieutenant and assistant surgeon, United States Army, and four acting assistant surgeons. Drs. Burke L. Johnson and Gilbert E. Seaman deserve especial mention for their uniformly faithful and efficient work in the medical wards and care of cases of smallpox.

Hospital corps personnel.—The hospital corps detachment averaged daily present for duty, 2 hospital stewards, 2 acting hospital stewards, and 52 privates. I have the

honor to commend the following hospital corps men: Hospital Steward Paul L. Whitmarsh, United States Army, for faithful and efficient performance of his duty; Hospital Steward Henry C. Seneca, United States Army, for prompt, faithful, and efficient performance of his duty in the medical supply depot; Acting Hospital Stewards Gustav Bornhauser and Ernest A. Boeckh, United States Army, for particularly correct and efficient work and faithful devotion to duty in the record office at all times, and often when in ill health, and for their undoubted qualifications to perform the duties of hospital steward, United States Army, I recommend that they be promoted to that grade on the occurrence of the first vacancies, after conforming to existing regulations. For honest and faithful service: Privates Theodore C. Eppelin, Frederick James, Nickolis Veit, Joseph B. Jensen, Oliver C. Weldon, Edward L. Wilhelm, Ralph W. Ent, Joseph R. Gardner, Walter T. Pulpress, Irwin Kline, and Victor A. Swonberg. I recommend that Privates Eppelin and James be promoted to the grade of acting hospital steward, for faithful and efficient service in the dispensary and medical supply depot, respectively.

REPORT ON THE BASE HOSPITAL AT DAGUPAN, PANGASINAN, LUZON, BY MAJ. F. H. TITUS, SURGEON, UNITED STATES VOLUNTEERS, TO THE CHIEF SURGEON, DEPARTMENT OF NORTHERN LUZON, DATED JUNE 1, 1900.

The hospital is pleasantly situated on the left or west bank of one of the mouths of the Agno River, about 1½ miles from the Gulf of Lingayen. It is rather an estuary than a river, as the water flows alternately in opposite directions, and is salt. The land is but little above high-tide level. The rise and fall of the tide is small—not more than 3 feet at spring tide. The principal portion of the town of Dagupan lies on the opposite bank of the inlet, while to the west and northwest are salt marshes.

The principal building, and, in fact, the only one used for strictly hospital purposes at present, was intended for a college. It is L shaped; one wing extending north and south along the water front and the other extending westward from the southern end of the first. The lower story is of masonry and the upper of wood. The floors of the lower story are mostly of cement or tiling, and are in quite good condition; but those of the upper floor, which are of wood, are old, and were not of the best quality when new. The cracks between the boards of the flooring and various holes in them allow the free passage of water, and as there is no ceiling to the rooms below, it is impossible to scrub the floors of the second story without almost surely soiling whatever may be in the rooms below. The absence of ceiling also renders the building very noisy. The roof is of galvanized iron, and is in very good repair.

On the north side of the grounds is a stone wall, and on the west front has formerly been a fence of a combination of wood and brickwork, of which the latter only remains.

The kitchen is a temporary expedient of bamboo and nipa, entirely unsuited to the rainy season. A stable of the same material has just been constructed for housing the ambulances and animals. I think it will answer the purpose very well.

The portions of the building now occupied as wards cover about 17,600 square feet of space, which would give room for 352 patients, allowing 50 square feet to each; but on account of the shape of the rooms some of the floor space is unavailable; allowing 5 feet in length of ward for each bed reduces the number which can be comfortably accommodated without crowding to 293.

In the matter of quarters for officers, female nurses, and men of the hospital corps, the hospital is at present poorly equipped. The officers and nurses are in native houses in the neighborhood of the hospital, none of them suitable for the purpose, while the men of the corps have no shelter but tents. At the request of the chief surgeon of the department, an estimate was sent in for the construction of a suitable barracks for the men. It has been returned disapproved, with orders to floor the tents with bamboo, which it is considered will be sufficient for their comfort in this climate, a view in which I do not participate.

I am informed that a requisition has been made for thorough repairs and additions to the hospital, and also that it will not be approved.

Food.—It has at times been difficult to provide the proper kind of diet for the sick, from the impossibility of procuring stores from the commissary. Chickens and eggs are to be procured from the natives, and usually at reasonable rates, but practically nothing else.

Medical supplies.—Since my connection with the hospital there has been but little trouble about the supply of medicine, but some badly needed supplies have been slow in arriving.

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Medical officers.—The medical officers on duty at the hospital I have found to be competent and reliable. There should in my opinion be one or two additions made to the number.

Hospital corps personnel.—The steward and acting stewards are excellent men, but I regret to say that as much can not be said of the privates as a whole, though there are many good men among them.

Trained nurses.—There are fifteen trained nurses assigned to duty at this hospital, and most of them are competent and trustworthy. To me it is a satisfaction to have in immediate charge of the sick persons trained to the work.

Water supply.—The drinking water in use during the dry season, at least, is procured from wells, and being in the immediate neighborhood of the salt water, is, as would naturally be expected, slightly brackish. It is all boiled and filtered before being used. The supply is ample.

Sanitation and disposal of faces, etc.—Dry earth closets are used. The only method of disposing of faeces, slops, etc., at present possible, is to empty them into the water in front of the hospital, where they, to a large extent remain, as the outgoing tide is not strong enough to carry them far enough out to prevent their floating in again when the tide turns, and from the configuration of the land, and the usual direction of the wind, the refuse seems to lodge mostly in the immediate front of the hospital, to our great annoyance, to say the least. Requisitions have been made for a boat or scow to take the refuse out to sea and dump it, and for a steam launch to tow the same. It is earnestly hoped that these requisitions may be approved.

For the launch there is the still further necessity that there are two bridges between the hospital and the railroad station where nearly all the patients are received, distance about a mile and a quarter, which bridges, I am informed, are carried away every winter, and without water communication of some kind there would be no means of bringing the patients here.

Special diseases.—The principal diseases met with are diarrhea, dysentery, and the different forms of malaria; these three causes furnishing 60 per cent of the total of cases. The greater portion of these cases are amenable to treatment; but some are very stubborn, and in all cases of sickness here the debilitating effects of the climate must be contended with. Many cases which would apparently continue indefinitely here, when sent to the United States arrive there quite well.

We have occasional cases of pernicious malaria, which require heroic treatment, and even then the results are by no means always satisfactory.

The treatment of dysentery by large doses of ipecacuanha has been usually followed in this hospital with satisfactory results.

Dagupan is an important station, being the terminus of the railroad from Manila, and also accessible by water. It will probably increase in importance in the future. This building, while susceptible of many improvements, is much better adapted to its present use than most buildings not constructed for the purpose, and the manner in which it has been equipped is, on the part of the medical department, very liberal.

REPORT OF MAJ. EUGENE L. SWIFT, SURGEON VOLUNTEERS, CHIEF SURGEON SECOND DISTRICT, DEPARTMENT OF NORTHERN LUZON, TO THE CHIEF SURGEON OF THE DEPARTMENT, DATED AT APARRI, MAY 31, 1900.

Geographical area, etc.—Provinces of Cagayan, Isabela, and Nueva Viscaya. Command: Sixteenth United States Infantry and two battalions of the Forty-ninth United States Volunteer Infantry. Medical officers 10, including 5 acting assistant surgeons, with 3 hospital stewards, 2 acting hospital stewards, and 41 privates of the hospital corps; no trained nurses.

Medical administrative features.—The chief surgeon is stationed at the headquarters of the district at Aparri. Medical officers are not assigned specially to the regiments, but are stationed at posts where their services are needed.

Methods of caring for the sick and wounded in the field, especially during action.—Most of the large posts in the district have the medical and surgical chests and sterilizer. Some stations which should have this necessary field equipment are without them. Only two stations Aparri and Tuguegarao, have ambulances. Requisitions have been made for field equipment of stations. Insufficient quantity of litters throughout the district. Transportation for medical supplies when taken in the field inadequate.

Regimental and camp hospitals.—There are no regimental hospitals, as the troops of the different commands are intermingled at the different stations. Base hospital of the district at Aparri, a comfortable hospital; supplies running short. Camp hospitals at Alcala, Ilagan, Echague, Solano, and Tuguegarao. All in comfortable buildings.

Medical supplies.—Medical supplies very deficient. Requisition made April 5 received here on the 23d instant. Supplies for all stations in the district in need of them are being forwarded as rapidly as possible. This requisition was approved in the office of the chief surgeon, Division of the Philippines, on April 9. A great deal of it has not been filled, and the former officer in charge of this office did not call for sufficient supplies. In a few days a requisition for supplies sufficient to carry this district through the rainy season will be forwarded. All the posts have been urgently calling for supplies, and until recently there have been none on hand to send them. On my inspection I found troops in the province of Nueva Viscaya almost destitute of medical supplies; requisition forwarded at once by courier, and telegraphic requisition made upon the chief surgeon, Department of Northern Luzon. It is hoped that these supplies reached them before May.

Supplies are obtained for the Cagayan Valley by requisition on the subsupply depot at Aparri; for Nueva Viscaya, overland from railroad to Caranglan, and over the mountains by Corribillos Pass.

Transfer of sick and wounded to other hospitals.—Convalescents from long illness, where it is deemed advisable in each particular case, are transferred from the camp hospitals in the Cagayan Valley to the base hospital of the district at Aparri. Chronic cases and cases requiring the attention of specialists transferred in like manner. Nueva Viscaya cut off by reason of the character of the trails leading out of that province.

Sanitation.—Sanitation of all camps carefully taken care of. Water boiled. Fæces deposited in deep pits, more than one hundred feet distant from kitchens and barracks, covered over daily with dry earth, and in some posts burned over daily by means of dry leaves or hay. Dry earth closets being shipped to all camps in the district will soon be in use. Slops deposited in pits more than one hundred feet away from the kitchens and sleeping apartments, or hauled and dumped in the large rivers.

Sleeping arrangements.—In buildings hired for the purpose; in many camps repairs needed to quarters to keep out the rain.

Food.—Army rations. Potatoes unable to be shipped beyond Tuguegarao. All other camps do not get potato ration. Fresh beef at Aparri, Lalloc, Tuguegarao, Ilagan, and Lineo; all other stations seldom get fresh beef. Echague, Cordon, Carig, San Luis, and all other posts in Nueva Viscaya on three-fourths rations up to April 20, 1900; also without fresh meat or potatoes. Fresh meat they have managed to obtain in the set of stations just mentioned about once a week. An epidemic of rinderpest among the cattle in this locality is reported to have recently broken out.

Cooking, etc.—Field ranges at all stations.

Efficiency of medical officers.—With the exception of Capt. Robert Burns, assistant surgeon, United States Volunteers, and First Lieut. W. P. Chamberlain, assistant surgeon, United States Army, the medical officers are without experience in administrative work, the keeping of records, and the preparation of papers. Acting Asst. Surg. J. S. Hill sick. All officers appear to be zealous in the performance of their duties.

Efficiency of the hospital corps—Almost all the men of the hospital corps are recruits or men of short service, and the greater part of them lacking in instruction.

Prevailing diseases.—Variola, diarrhea, dysentery, and malarial fever. These diseases were prevalent in the country before our troops entered it. Variola due to the carelessness of the natives and neglect of vaccination. Other diseases mentioned endemic in the country. Malarial fever due to the presence throughout the island of Luzon in an intense form of the germ upon which the disease depends; in Nueva Viscaya particularly malignant. Diarrhea and dysentery due to tropical climate, great moisture, and rainfall, and the drinking of contaminated water. These diseases particularly severe in the province of Nueva Viscaya.

Vaccinations.—All the troops at Aparri and in the province of Nueva Viscaya vaccinated, but virus inactive on account of the length of time required to transport to the stations in the province mentioned. Other virus has lately arrived and troops will be revaccinated. Troops of the Second Battalion, Sixteenth United States Infantry, stationed at Ilagan, have been vaccinated during this month, but the two companies of this battalion stationed at Tuguegarao not yet vaccinated. Troops of the Third Battalion, Sixteenth United States Infantry, partially vaccinated during this month. Troops of the Forty-ninth United States Volunteer Infantry vaccinated four times previous to their arrival in the district.

Virus now being sent up the river for the vaccination of the native population. The native population of Aparri and its surrounding barrios vaccinated during this month by native vaccinators.

REPORT OF LIEUT. W. P. CHAMBERLAIN, ASSISTANT SURGEON, UNITED STATES ARMY, ON THE HOSPITAL AT APARRI, CAGAYAN, SECOND DISTRICT OF THE DEPARTMENT OF NORTHERN LUZON, MADE TO THE CHIEF SURGEON OF THE DEPARTMENT, JUNE 1, 1900.

Command.—The command at this post has been the headquarters Sixteenth Infantry, with band, headquarters, and usually three companies of the First Battalion of the regiment. In addition, this hospital receives patients from the remainder of the Sixteenth Infantry and from two battalions of the Forty-ninth United States Volunteers, stationed in this district.

Hospital buildings.—The present hospital building has been occupied since the early part of March. It is a substantial structure of large size, with a basement of stone about 8 feet in height. The second story of the building is constructed of wood, with a galvanized-iron roof. Windows are closed with the usual sliding sash, set with oyster-shell plates. Nearly all windows are shaded with nipa awnings. In the basement are the storeroom for the hospital and district supply depot, and also two native shops, from which it has thus far been impossible to have the occupants removed. This basement is for the most part tiled, and is fairly well ventilated. In the lower hall is the dispensary, and sick call is held here. In the hallway of the second floor are placed the tables for the mess of the hospital corps and patients. The office has till recently served also as the office of the chief surgeon of the district. The officers' ward is the most secluded and has 5 beds. There is a large central ward, accommodating 17 patients, and three small wards, one of which is used for colored patients and contains 8 beds. The total capacity of the hospital at present is 46, with an average floor space of 48 square feet and an air space of 503 cubic feet per man. Cubic air space is, however, not an important problem here, as approximately one-third of the wall space is devoted to windows, which are always open, thus offering a rapid change of air. The operating room is conveniently located and well lighted. It is provided with an iron operating table, a Kelly pad, sufficient basins, pitchers, and jars for dressings, and enough of instruments for ordinary needs. Back of the operating room is a room for dressings and instruments, also containing a blue-flame oil stove. No bottles for solutions nor flasks for flushing nor a suitable Arnold sterilizer have been furnished, though asked for on requisition, which was approved. The kitchen is ample in size and has attached a sufficient storeroom, secured by lock and key. An excellent range of large size is provided and does efficient work. The outfit of cooking utensils is enough for all needs, as is also the table equipment. The cots throughout the hospital are of the regulation adjustable pattern and are all provided with three-section hair mattresses, protected with mattress covers. Feather pillows, sheets and pillow slips, pajamas, nightshirts, and slippers are in abundance. Washing is done in a reasonably satisfactory manner by native women, who are paid at the rate of 2½ cents, gold, per piece. All articles in any way infected are soaked for at least twenty-four hours in carbolic-acid solution (1:20) before leaving the hospital.

Water supply.—This is satisfactory. At present the whole post is provided with rain water, which is boiled in a Waterhouse-Forbes sterilizer and then distributed to barracks, hospital, and officers' quarters. Moreover, a supply of rain water is always on hand in the hospital, being kept in a large boiler-iron tank provided for that purpose. Well water in this town is bad, being all from shallow wells affected by proximity to salt water and liable to many kinds of surface contamination. Bathing facilities are satisfactory, a bath tub on wheels and washstand being located in a portion of the hall screened off as a lavatory.

Food supply.—This has been, on the whole, satisfactory. Purchase of eggs, chickens, fresh fruit, and vegetables in open market are generally possible, and fresh beef of fair quality is available every other day. Excellent bread is furnished from the post bakery. Certain supplies, such as malted milk, evaporated cream, condensed milk, and some varieties of soups, can not always be obtained from the commissary. Evaporated cream and malted milk have been asked for on medical requisitions, which were approved; but none of the former and little of the latter have been received. The cost of the mess for patients in February was 39 cents per man; in March, 31 cents; in April, 39 cents, and in May, 39 cents. Savings from the hospital corps ration was in January, $11.94; February, $4; March, $4.75; April, $7.67, and in May, $7.21. The hospital fund has been steadily increasing, and on April 30, 1900, the balance on hand was $110.37. Since then $20 have been transferred to the hospital at Ilagan, but the receipts this month will probably be double that sum. This fund is not needed to buy articles of diet. Authority has been requested to expend a part of it to purchase a milch carabao, and another portion to buy certain articles of durable property, which will be very convenient for ward management and which can not be otherwise obtained.

Disposal of excreta and waste.—The water-closet is unfortunately situated adjacent to the kitchen, this being unavoidable, owing to the plan of the house. There is, however, no communication between the two, and the walls separating them are papered on both sides. The door is kept constantly closed by a weight. Excreta is received in closed stools, which are kept always covered when not in use, and carbolic-acid solution (1:20) is frequently added to the contents. The receptacles are emptied at regular intervals. A dry-earth closet in a tent back of the hospital is used by the corps men, the pans being daily cleansed by contract labor. Garbage and slops are deposited in barrels and hauled away daily.

Medical officers.—The detail of medical officers at this post has been as follows: From January 1, 1900, to March 28, 1900, one assistant surgeon, Lieut. H. S. Greenleaf; from March 28 to May 31, Lieut. W. P. Chamberlain, with, since March 12, one acting assistant surgeon, Dr. Nevil M. Garrett. In addition to post work, the assistant surgeon has, until May 17, performed the duties of chief surgeon of the district, and has acted, and still continues to act, as health officer of the post and sanitary inspector of the town, visiting all steamers and coasting craft on their arrival and departure from the post, and making a bimonthly house to house inspection of the town.

Hospital corps.—The men stationed at this post are approximately 1 hospital steward, 1 acting hospital steward, and 12 privates of the corps. During the last two months 2 and at times 3 men have been on detached service. In addition to the regular post hospital work a large amount of additional work has fallen upon the corps here by reason of the correspondence and paper work connected with the chief surgeon's office, and as a result of receiving, assorting, packing, and shipping of medical supplies for other stations in the district. All the members of the corps since my arrival have discharged their duties in a manner reflecting much credit on themselves and upon the officers who supervised their previous training. No instances of distinguished service by medical officers or Hospital Corps men have come to my notice, but prior to my arrival Hospital Steward Thomas D. Hare, United States Army, lost his life in the honorable discharge of his duty, being either shot or drowned on the night of March 1, 1900, when a launch loaded with troops was capsized near Linao, being at the time under heavy fire from the insurgents on shore.

Hospital Corps quarters.—A separate house is rented by the quartermaster for hospital corps men. This contains a room each for two stewards and two rooms for the privates.

Civilian employees.—No female nurses have been on duty at this hospital. Four natives are employed at the rate of $3 (gold) per month, and are found very useful for doing rough work.

Administration.—This has been satisfactory. The mess management is under the direct and constant supervision of an acting hospital steward. An excellent nurse as wardmaster cares efficiently for the needs of the sick. The operating room is under the immediate charge of a private of the Hospital Corps, who is a graduate dentist and possesses an excellent theoretical and practical knowledge of minor surgery and the care of an operating room.

Equipment and clothing.—This is satisfactory. The press of work in the case of both surgeons and corps men has prevented systematic training by lectures and litter drill.

Dentistry.—A graduate dentist (recently examined for promotion to acting steward), stationed at this hospital, has just received a portion and soon expects the remainder of a complete dental outfit, after which he will be available to attend to the needs of those in the district requiring the attention of a dental surgeon. His employment at this work will doubtless add not a little to the value of the services performed by the Medical Department in this region.

Medical supplies.—These have been satisfactory in quality, but many important articles of medicines and dressings have been entirely lacking during May on account of the delay in filling the requisition of April 5 sent from this hospital. The supplies did not arrive until April 23, 1900. Blank forms of many kinds have been exhausted and none have been received, though asked for on requisition dated March 24, 1900. A microscope is much needed and was invoiced to this post, but failed to arrive, and no other has been sent, though asked for.

Library.—A library of 15 standard medical works has been supplied to the hospital, and of late medical journals have been sent into this district for circulation among the medical officers here stationed. A large number of old periodicals have been furnished by various societies for the use of patients. A request to purchase standard American newspapers and magazines from the hospital fund was disapproved.

Character of diseases.—It is impossible to determine the percentage of total sickness or of any particular disease, because the number of troops served by this hospital has

been so variable. No disease has been present in a marked degree, and all have been of mild type. Malaria has never been severe or well marked, and in default of a microscope there has been some doubt as to accuracy of the diagnosis in the cases of slight fevers of short duration. Diarrheal diseases have not been of severe type, but many have shown a decided tendency to become chronic. Venereal diseases were very prevalent here at the time of the arrival of the Sixteenth Infantry from the country just north of Manila, being almost entirely acute gonorrheal and chancroidal. The amount has been steadily decreasing, and in May only one new case appeared on sick report. Skin diseases have been few in number and slight in degree. Only one case of typhoid has occurred, and that probably did not originate at this town, as the patient entered hospital but twelve days after his arrival here.

Wounds.—The marked increase of wounds and injuries in March resulted from the fight near Linao, March 1, 1900. All these gunshot cases occurred before my arrival, and when first coming under my observation presented nothing of marked interest. A compound comminuted fracture of both tibia and fibula, near the ankle, resulted unfavorably owing to impaired circulation in the foot, inability to hold the fragments in proper position, and apparent fibrous union. There is now some ankylosis of the ankle. A perforating gunshot wound of the chest resulted in marked pleural thickening.

Smallpox.—No case has occurred among troops at this post, although 13 cases have been found among the natives. All soldiers have been vaccinated twice since arrival at this station. Vaccination of all natives is now in progress.

Death.—None among patients have occurred since January 1, 1900. Five men have been killed in action or drowned from this command.

Transferred.—Nineteen men have been transferred to hospitals in Manila, of which 12 were for discharge for disability, 3 for special treatment, and 4 for transfer to the United States for benefit of climate.

Increase in size of hospital.—The hospital has of late been filled nearly to its limit as a result of patients coming from other parts of this district. The district chief surgeon has stated that still more are likely to be sent to this point as a base, and therefore a request has been made for an additional house which will accommodate about 30 beds, making an aggregate of 76 beds.

Recommendations.—This town is in a cool, healthful, and accessible locality, and is likely to continue to be the base for the district, which will for a long time to come require a considerable military force. In view of these facts the following recommendations are respectfully submitted:

(1) That proper hospital buildings be constructed here at the earliest opportunity, thus avoiding the present makeshift policy of occupying native houses, which are difficult to keep clean, are crowded to the lowest safe limit of individual air space, and which can not have the best through ventilation because of partitions dividing them into many small rooms. Particular attention should be given to the construction of the roof, as otherwise the temperature of the wards will be excessive most of the day. Either the building should have a ventilated attic or else the roof should be double, with an air space between. Galvanized iron alone will be exceedingly unsatisfactory. (2) That an ice plant be installed as soon as possible. This was asked for by Lieutenant Greenleaf in March and request was approved by the division chief surgeon. (3) That a small steam laundry be provided in the interests of both economy and efficiency. The advantages of having clothing and bedding boiled at the time of washing are numerous, and no native washerwoman does this. A laundry could be run from the same boiler that furnishes power for the ice plant. (4) That female nurses be provided as has already been requested. Up to the last few weeks their services were not needed, but severe cases are now appearing and will probably continue to appear. (5) That iron bedsteads with woven-wire springs be sent to replace adjustable folding cots.

Report of Maj. Franklin A. Meacham, Surgeon, United States Volunteers, Chief Surgeon, Third Military District, Department of Northern Luzon, made May 31, 1900, to the Chief Surgeon of the Department.

Pursuant to General Orders, No. 1, paragraph 2, dated headquarters Division of the Philippines, Manila, P. I., April 7, 1900, the Third Military district of the Department of Northern Luzon, was created by consolidating the territory occupied by the First and Fourth Brigades, Second Division, Department of the Pacific and Eighth Army Corps.

The Third Military district covers the territory lying within the provinces of Tarlac, Pangasinan, and Zambales, including the towns of Rosales, Cuyapo, and San Juan de Guimba, lying along the northwestern boundary of Nueva Ecija and adjacent to

Tarlac province. It is garrisoned by the Ninth, Twelfth, Thirteenth, Seventeenth, and Thirty-sixth Infantry, with eight companies of the Twenty-fifth Infantry, three troops of the Fourth Cavalry, and two companies of Macabebe scouts.

Regimental and detachment hospitals.—At regimental headquarters are located the regimental hospitals in charge of the regimental surgeon, except the regimental hospital of the Thirteenth Infantry, which is located at Dagupan instead of at regimental headquarters at Binalonan, on account of better accommodations and facilities for transportation. These hospitals have a capacity of from 15 to 30 beds and receive their patients not only from the headquarters station but from the various posts at which the regiment is stationed. They are established in some large building conveniently situated and selected for its sanitary surroundings. In towns where there were no suitable building, buildings have been erected at an expense of not over $220 (Mexican), containing dispensary, ward, kitchen, dining, and attendants' room; such buildings were erected at San Juan de Guimba and O'Donnell. The size of these buildings is 20 by 50 feet. At posts at which medical officers are stationed detachment or camp hospitals of from 4 to 10 beds have been established. From these detachment hospitals patients are transferred to the regimental hospital, or direct to the base hospital at Dagupan, or to the field hospital at Angeles, as may be considered judicious. At posts where there are no medical officers, a dispensary has been put in charge of an acting hospital steward, or, as in some instances, a private of the hospital corps selected for his experience and intelligence. At Capas and Murcia, small but important stations along the railroad, a building 10 by 15 feet, suitable for a dispensary, was erected, there being no other building obtainable. The aim has been in preparing for the rainy season to establish these camp and detachment hospitals at posts which are most liable to be cut off from the medical supplies at the regimental hospital, or from the railroad, or which can not be reached by boat, as in certain parts of Zambales province.

Some medical officers must visit several stations, and as these stations are often at a considerable distance apart, it happens that medical officers and hospital-corps men are the greater part of the time in the saddle and necessarily in constant danger in visiting their respective posts, it being impossible on account of the constant movement of troops to obtain a sufficient escort. This work will be doubly severe during the rainy season, on account of the almost impassable roads, unless additional medical officers are provided.

Special diet kitchens have been established at regimental and camp or detachment hospitals quite generally, where men suffering from intestinal diseases and convalescents receive suitable food.

The 40 cents gold allowance covers all needful expenditures and affords ample facilities for surgeons to provide necessary delicacies for the sick.

The following classes of diseases not considered suitable for treatment in regimental, battalion, and detachment hospitals are transferred to second division base or field hospitals: Typhoid and remittent malarial fevers, chronic dysentery, and diarrhea, persistent anemia, serious affections of the eye, ear, bladder, urethra, rectum, stomach, liver, kidneys, skin, and nervous system, and surgical cases needing special operative procedure, and not requiring immediate attention; insanity, tuberculosis, chronic organic diseases of heart, kidneys, etc., and other diseases whose prognosis is unfavorable, are reported to the department surgeon and authority obtained for their transfer to Manila, or such hospital as may be designated, for observation and final disposition.

The muster and pay rolls are prepared at the detachment station, or by the regimental surgeon, as deemed advisable. Every change in status of the personnel of the medical department, such as arrivals or departures, field duty, leaves of absence, or transfer to other stations, is reported to the district surgeon through the regimental surgeon, by telegraph, when practicable, followed by information slip, the district surgeon in turn reporting to the department surgeon. All orders and official papers are transmitted through the regimental surgeons from these headquarters.

Medical supplies.—Medical and hospital supplies for this district are obtained from the medical supply depot at Angeles, except for the Twenty-fifth Infantry, in Zambales province, which receives its supplies direct by boat from the medical supply depot in Manila, owing to the length and difficult transportation from Angeles. Each regimental surgeon makes a monthly requisition for such medical and hospital supplies as will be required by his entire regiment for this period. Camp or detachment hospitals and dispensaries are supplied from the regimental hospitals. The medical officers of the various posts make these requisitions once a month upon the regimental surgeon. Medical and hospital supplies have been ample. Food for the diet kitchens is obtained from the regimental sales commissary. Each post has

HOSPITAL, SEVENTEENTH UNITED STATES INFANTRY AT BAUTISTA, LUZON.

already been supplied for six months, to carry them through the coming rainy season, beginning with the first day of June.

Water supply.—The water supply is from wells, running streams, a few springs, and a good artesian well at Tarlac. The wells are shallow and walled with stones. When our troops first occupied the towns only such wells were used as were recommended by the medical officers after careful inspection. All others were closed. Those selected were cleaned out and the walls raised about 2 feet above the surface and protected by suitable covers. These wells were selected with great care as to the surrounding drainage, and were as far removed from sinks and garbage pits as possible. Water from all sources has at all times been boiled and filtered. Each company has one Pasteur filter. After filtration the water is cooled in large earthen jars, which are cleaned each morning. These instructions have been faithfully carried out during the past dry season by the troops in this district, as far as personal observation and repeated inspections can determine. In a few instances company commanders have kept cold coffee constantly on hand, cooled in the earthen jars. In the regimental hospital, Seventeenth Infantry, weak cold tea has been kept for general use. The task of habituating the soldier to the use of boiled water while in camp has been difficult, its smoky and insipid taste being objectionable, but this has gradually been overcome. Several Waterhouse-Forbes sterilizers have been in use in this district during the past two months. This sterilizer has so far given entire satisfaction, as now furnished for field use, doing away with the objectionable taste heretofore experienced in water boiled over camp fires.

Laundry and bathing facilities.—For a long time the laundry facilities consisted simply of native laundresses, who pound out the dirt with clubs in cold water, drying the clothes on the grass in the sun. The majority of the soldiers do their own laundry work, and for a long time used the method practiced by the natives at the streams and pools wherever they happened to camp. It was soon learned that this method furnished abundant opportunity for the transmission of various mycotic diseases. This has been remedied to a great extent by insisting upon the boiling of the clothes, orders to that effect having been issued from Second Division Headquarters. During the past dry season the bathing facilities at the various posts, except those on the larger streams and seashore, have been nil. All seem to have readily adopted the primitive methods of the natives. The regimental hospitals, however, have been furnished with portable bath tubs.

Barracks and buildings.—The troops are quartered in the deserted Spanish convents, other public buildings, and nipa houses, throughout the various pueblos and barrios. In the convents and public buildings troops occupy the second story, the first story as a rule being occupied for administrative purposes. The nipa huts occupied are raised from 6 to 8 feet from the ground. The ventilation in all instances is the best, and there is no overcrowding. Barracks and buildings are regularly inspected and are kept neat and clean. Medical officers are held strictly responsible for the sanitary condition of the posts in their command. All barracks and buildings have been repaired and put in condition for the coming rainy season. At such posts where suitable buildings for the rainy season do not exist such buildings for the troops, stores, and animals are now being constructed.

Policing.—The policing of the grounds about the barracks and buildings occupied by troops is excellent and is regularly done. This good example has had its influence more or less throughout the various pueblos and barrios. Where troops are stationed such policing is done by the presidente of the town and by the cabezas of the barrios, under instructions from the commanding officers. Large quantities of underbrush, banana trees, and the like have been removed from around the buildings and huts, allowing the free entrance of the sun. The work has been going on throughout the present dry season, and particularly is this true concerning the many market places. These are regularly policed after each market day and the refuse burned. The general appearance of the towns since the advance of our army north from Angeles, November 8, 1899, has improved wonderfully and countless insanitary evils among the natives have been remedied.

Disposal of waste.—No ground drainage except by percolation through the soil. Dejecta are disposed of in sinks. The individual covering of the dejecta by dry earth is in use by all troops and is very rigidly enforced. Any neglect of this order is severely punished. At times the bottom of the sinks are covered with twigs, straw, and paper, which are then burned. This entirely destroys any slight odor that may have been present. The digging of pits for kitchen slops and fecal matter less than 100 yards from the men's quarters is prohibited. Garbage is disposed of in pits and covered daily. This system, during the dry season, has given entire satisfaction. At the present time, as the rainy season is approaching, the dry-earth

closet system is in use. Each company and detachment throughout the district, regimental headquarters, and all officers' quarters have been provided with these closets as furnished by the quartermaster's department. These closets are covered by suitable sheds and surrounded by a ditch so dug as to allow all rain water to flow away. This is the only system which can be used during the rainy season with any degree of satisfaction. At posts located on the seacoast closets have been built over the water, with suitable covering. Garbage is collected in barrels and cans provided by the quartermaster's department, which are emptied and cleaned every morning by hired scavengers. At some posts dry earth has been collected and properly protected for use during the rainy season. The natives have no method of disposing of garbage or faecal matter. In the dry season garbage and faecal matter in the yards and streets are disposed of by the dogs and pigs, while in the wet season the heavy rains are depended upon to remove the filth.

Clothing.—The clothes must be loose and comfortable. On the march part woolen should be worn next to the body. Experience during the past wet and dry seasons shows that the clothing now furnished is fairly well adapted to this climate. The supply at the depots has been sufficient. The shoes and socks give entire satisfaction. For the march the light woolen sock is preferable.

The recent issue of the campaign hat with corrugated sweat bands and ventilation in the sides possesses advantages not obtainable in other form of headgear for constant use and all around field service. It is far superior to the straw hat, and, during the rainy season, to any cork or pith helmet. The latter requires more or less care at all times, both on and off the head.

A part woolen undershirt is necessary to protect the body from sudden chilling. The cotton or nankeen undershirt is cold, clammy, and sticks to the body while in profuse perspiration. This is especially noticeable during the five minutes' rest given hourly on a regular march.

The lighter issue of the blue flannel shirt answers fairly well at all times, but is objectionable in some respects. Its color more readily absorbs the heat and can be distinguished a long distance, making the wearer a good mark for the enemy. A gray flannel shirt of medium weight is preferable. The flannel shirt has the advantage of keeping the body warm, even when wet, night and day. The soldier prefers to wear the blue flannel shirt on the march, with no undershirt, the sleeves rolled up, open in front, and the collar well rolled back. It is thus made very comfortable, the campaigner readily becoming accustomed to the sun's rays. One great objection to this shirt is its irritating effect on the skin. On returning to camp at night the soldier puts on the cotton undershirt as a protection against this irritation.

Of the clothing furnished at present for active campaigning, I have found that the light-gray woolen undershirt of light weight, with an overshirt of chambray or gingham, gives comfort and satisfaction. Personally I have found the most comfort from the gray outing flannel of medium weight, worn with no undershirt. This same material of a khaki color would be still better. It prevents chilling, is never too warm, nor sticks to the body, but absorbs the perspiration and dries readily. A cotton undershirt worn under this while in camp gives one the greatest amount of comfort, and is sufficiently warm for the night. As the nights here are usually cool, sufficient covering for the abdomen must be worn. For this the blue flannel shirt answers well; in fact, it has become quite customary when not on the march, but lying in camp, for the soldiers to wear the blue flannel shirt at night. The coolness of the night while lying down is severely felt upon the abdomen, often enough to keep one awake and interrupt his rest. Even a slight covering is a help, and for this the flannel bellyband should be worn. The neglect of this is undoubtedly the predisposing, if not often the actual exciting cause of many of our intestinal ailments.

The white jean drawers answer all conditions at all times; they are loose, comfortable, and safe.

The khaki fatigue uniforms are excellent.

During the wet season the large ponchos now furnished are of more service than a rain coat or mackintosh. They protect sufficiently well and are not as hot as the mackintosh; besides, they serve as a blanket or covering at night.

The above remarks refer only to field service.

Food supply and its preparation.—The ration as now furnished by the subsistence department to the troops in this climate is of the first quality, and, as a rule, well prepared for use. It occasionally happens that its preparation is faulty, but this is due to the inexperience of the cooks. With the system of company savings it is difficult to see wherein any change in the component parts of the issue ration would be of any material benefit. Such foods, peculiarly adapted to the localities or climate in which the troops are stationed, are obtainable in the markets of such localities. Much of late has been said that the animal foods should be reduced one-half,

substituting an equal amount of the farinaceous foods. Experience with the meat ration as issued to-day in these islands shows that our troops in the present hard and continuous campaigns not only require the quantity of animal food they have been accustomed to, but actually crave it and use it with no ill effect. This I have heard expressed by officers and men on many occasions. However, for tropical use I believe the present issue of albuminous compounds and hydrocarbons or fats should be reduced a certain small percentage, more especially the fats, and their place be advantageously taken by the sugars. In other words, the sugar components of the ration for tropical use should be increased. This reduction of animal food is already accomplished by the full allowance of fresh beef seven out of ten days, and equal money value for the remaining three days of other articles for sale issued. This saving, together with the usual company saving on pork and bacon, will purchase the requisite amount of sugar necessary for the increase of this component. All that is really necessary to obtain the best dietary for tropical use is for medical officers to call the attention of company commanders to the fact that in the sugars we have a food that undoubtedly promotes health and enables the soldier to put forth greater exertion to overcome his many hardships. Company commanders may thus vary the daily dietary by the purchase of more sugar for the suitable preparation of the dried fruits, or preserves, jams, and jellies provided by the subsistence department. To the increased sugar component should be added chocolate. In this present campaign, who has not seen and personally experienced the benefit derived from the sweetened chocolate while on a fatiguing march in the hot sun? It is more or less customary to carry in the pocket a package of this sweet chocolate when it can be obtained. The avidity with which the soldiers, both old and young, welcomed the supply of confections sent to these islands bears out these statements. Our troops in the present campaign have done and are still doing more actual work than the ordinary man, and the dietary as modified above answers most admirably. What change in the present ration the conditions of garrison life in times of peace in this climate will receive is a question which must be decided by experience.

Prevailing diseases.—Diarrheal and malarial diseases cause by far the greater number of admissions to the sick report, while rheumatism and diseases of the respiratory organs form the smallest proportion. There has been a comparatively small number of cases of typhoid fever since the Second Division advanced north from Angeles last November. The majority of the cases that have occurred developed early in the present dry season, reaching its maximum during the month of March. From March to the present time the number has steadily diminished. That typhoid fever is endemic among the natives in these islands is now beyond dispute. The source of infection among the troops has been clearly traced to drinking water while on the march or scouting. I have already reported cases of typhoid occurring in this command in my weekly inspection reports of December, 1899, January and February, 1900. Since that time there have been abundant opportunities for seeing cases among natives who are sick with the so-called "calentura" or fever, which from its history and the clinical picture presented I recognized as typhoid fever. I have learned also from Dr. Barrera, a native physician of Concepcion, province of Tarlac, that typhoid existed in that town principally during the dry season. He speaks of it as *calentura intestinalis*. I learned the same fact from a native physician at Victoria, province of Tarlac, Dr. C. B. Lazaro. These physicians are well educated medical men, Dr. Lazaro having studied in Paris and Madrid. The recent outbreak of typhoid in a command stationed at Paete, on Laguna de Bay, traced to drinking water, adds additional proof.

All conditions exist among the natives for the prevalence of typhoid in these islands, there being absolutely no sanitary precautions in the rural districts. Dejecta and refuse of all kinds are scattered over the whole country during the rainy season, as reliance is placed upon the rains for cleaning their streets, yards, and outhouses. No one who has seen the native market venders handle and prepare their vegetables and other classes of foods in the same canal or pool wherein they dump refuse and wash their persons and clothing could wonder at the prevalence of *calentura intestinalis* in these islands.

There is a large prevalence of skin diseases, especially of mycotic origin, popularly called dhobie itch, situated in the groins, about the genitals, and in the axillæ. This affection is widely distributed, and often so severe as to unfit men for duty.

Habits of the men.—The habits of the men as a rule are excellent. The hard work of patrolling the many roads, scouting, and the vigilance required against frequent attacks, has taken away the greater part of any craving for immoral pursuits. Base ball is not infrequently indulged in. Cleanliness of clothing has been good. Intemperance is rare, although not a few are addicted to the use of the native gin, known as vino or anasau, the effects of which are most disastrous. One death occurred in

the Thirteenth Infantry at Magaldan, suddenly, following the eating of a large number of mangoes and drinking a pint of this vino. The establishment of canteens, where cool beer could be obtained, has almost done away with vino drinking.

The percentage of venereal diseases is greater than it should be, occurring largely among those of other vicious habits.

Reading rooms have been established at many of the larger posts, which are of great benefit to the men.

Major Meacham closes his report with an account of the vaccination of natives in the various towns of the district, a summary of which has already been given in the report of the chief surgeon of the department (see page 123).

REPORT OF MAJ. H. S. T. HARRIS, SURGEON, UNITED STATES VOLUNTEERS, CHIEF SURGEON FOURTH DISTRICT OF THE DEPARTMENT OF NORTHERN LUZON, SAN ISIDRO, JUNE 25, 1900.

The district embraces the province of Nueva Ecija. The following stations along the Rio de la Pampanga are garrisoned by the Twenty-second Infantry: San Luis, Candaba, Arayat, San Antonio and San Isidro. Eight companies of the Thirty-fourth Infantry garrison the towns of Gapan, Penaranda, Cabanatuan, and Bongabong, all of which places are in the eastern part of the valley of Luzon; Aliaga rather to the westward in the edge of the great swamp, and Baler on the east coast. The towns of Pantabangan, Carranglan, San Jose, Hummingan, San Quentin, Tayug, San Nicolas, and Santa Maria, all situated in the foothills or at the base of the mountains, are garrisoned by eight companies of the Twenty-fourth Infantry.

Stations of medical officers.—One medical officer is stationed at each of these towns, except San Luis, San Antonio, Gapan, San Quentin, Santa Maria, and San Nicolas, which places are attended by the surgeon of the nearest station. I have recently recommended that an acting assistant surgeon be sent to San Antonio, and also one to Gapan. Santa Maria and San Quentin are only occupied by half a company of troops each, and San Nicolas is only 3 miles from Tayug. San Luis is easily reached from Candaba by a daily boat on the river.

Personnel of the medical department.—There are 4 regular commissioned medical officers in the district, 1 volunteer, and 10 acting assistant surgeons. Under recent orders each one-company post will have 3 hospital corps privates, the large posts being proportionally supplied.

Supplies.—As a large number of the garrisoned towns will be cut off from all communication during the approaching rainy season it has been necessary to take every precaution to see that full medical supplies for six months should be on hand at every post. My predecessor gave the post surgeons warning months ago in the matter, and I have personally inspected the posts and the amount and character of their medical supplies, and caused requisitions to be made for all lacking articles at once. As the requisitions have always been filled and forwarded by Lieutenant Fauntleroy, acting supply officer for the department, with the greatest possible promptitude, I believe that the rainy season will pass with the least possible amount of suffering to the sick, considering the manifestly disadvantageous circumstances. Attention has also been given to the matter of commissary sales stores for use with the sick, as well as clothing for the well, during the rainy season.

Hospitals.—The hospitals of the numerous small posts are located in native houses of the usual style, and are adequate, though not luxurious in appearance. The contemplated extensions will give the district a very respectable hospital at headquarters at San Isidro.

Character of attendance and administration.—There is a notable improvement in the class of men enlisted for the hospital corps of late. The acting assistant surgeons employed differ a good deal individually in attainments, the average being good. The hospitals are generally quite well administered, and these gentlemen are gradually beginning to understand our system of paper work.

Transportation of wounded.—The work of the troops in the district having mainly been in the mountains where the trails are too rough and the turns too short for travois, the wounded have had to be brought out of the mountains by hand—a task of great difficulty. A litter of bamboo poles, with a horse hitched between the front ends of the poles and two men carrying the rear ends, was used in the foothills by Lieutenant Mitchell, Thirty-fourth Infantry, in bringing in wounded on one occasion. The strain upon the bearers is said to be very exhausting. A one-horse litter would seem to be best adapted to the service, although even this can not be used in the wild mountain country owing to the thickness of the growth.

Sanitation.—The sanitary condition of the troops is in general as good as the circumstances will permit. The dry earth-system has replaced the pits for latrines for the rainy season. The food is satisfactory, as also the cooking. All but the most remote posts have had fresh meat two or three times a week. This will not be possible during the rainy season. Some weevils have been noted in some of the sacks of flour.

Prevailing diseases.—The prevailing diseases are dysentery and malarial fevers. The summer months seem to be the worst season for the former affection. Last year dysentery almost disappeared about the month of October, from which time until well into December the rate of ineffectiveness from malaria was very high. Drinking water is boiled or sterilized all over the district in garrison, but as the men are constantly on detached service, they necessarily drink a large amount of unboiled surface water, which may account for the prevalence of dysentery. I do not know that my opinion, that the disease is most prevalent in the early part of the rainy season, is borne out by common experience. That malaria is worse just after the rains have ceased is a well-known fact.

Vaccination.—Vaccinators have been employed in all the garrisoned towns. Where compulsion in the matter has been used large numbers have been vaccinated, but the majority of the natives seem opposed to it and an order will soon be issued by the district commander directing that the native police be used to aid the vaccinators.

Conduct in action.—Acting Hospital Steward Walter K. Barnes, United States Army, will be recommended by the district commander for a certificate of merit for gallantry in attending the wounded under heavy fire during fighting with insurrectos in the mountains June 3 and 5, 1900.

First Lieut. Douglas F. Duval, assistant surgeon, United States Army, and acting assistant surgeon Walter C. Chidester have both acquitted themselves with credit under fire in recent affairs with insurrectos.

REPORT OF MAJ. HENRY F. HOYT, SURGEON, UNITED STATES VOLUNTEERS, CHIEF SURGEON FIFTH DISTRICT, DEPARTMENT OF NORTHERN LUZON, MADE TO THE CHIEF SURGEON OF THE DEPARTMENT JUNE 19, 1900.

In compliance with instructions from your office dated May 4, 1900, I have the honor to submit report of the medical department of this district from January 1, 1900, to May 31, inclusive.

GEOGRAPHICAL AREA OF ORGANIZATIONS.

Third United States Infantry.—The regiment is stationed along the line of the Manila and Dagupan Railroad from Polo on the south to San Fernando on the north, 2 companies at Hagonoy, 10 miles west of Calumpit, 2 at San Fernando, 1 at Mey Canayan, 1 at La Lombay, 2 at Malolos, 1 at Bulacan, 1 at Luiguinto, 1 at Calumpit, and detachments at Santo Tomas, Polo, Bigaa, and Apalit.

Thirty-second United States Volunteer Infantry.—On January 1, 1900, this regiment garrisoned Angeles, San Fernando, Calulit, Mexico, Santa Ana, Denalupijan, and Orani, P. I. On January 16, 1900, the regiment was ordered to garrison Bataan Province in addition to two towns in Pampanga Province, and is at present distributed as follows: headquarters, band, regimental scouts, and Companies C, D, and G, at Balanga, with detachment of C at Orion, and of D at Pilar; Company A, at Mariveles; Company B, at Orion; Company F, at Samal; Companies E and H, at Orani, with detachment of K at Llana Hermosa; Company I, at Florida Blanca; Company M, at Porac. The regiment is distributed on a line of about 80 miles.

Forty-first United States Volunteer Infantry.—The command arrived in Manila, P. I., January 4, 1900, in very good condition considering the long voyage and the fact that the men were not allowed ashore except at Singapore. There were no casualties en route. On reaching Manila the sick report consisted chiefly of twenty-two cases of parotitis, which were transferred to hospitals in Manila. For a few days after disembarkation the regiment was stationed at Ermita, Manila. During the month of January eight companies, with 2 medical officers, 1 hospital steward, 1 acting steward, and 8 privates, were stationed at Angeles, Mabalacat, Magalang, and Calulit, on or near the Manila and Dagupan Railroad; the other four companies, with headquarters and band, with 2 medical officers, 2 stewards, and 4 privates, were stationed at various points along the north line of defense of Manila, from blockhouse No. 5 to El Deposito. In February these four companies and headquarters took station along the railroad and from February 5 to May 31 have occupied the following stations: Angeles, Calulit, San Fernando, San Pedro, Magalang, Mabalacat, Calumpit, Bacalor, Guagua, Santa Rita, Sexmoan, Lubao, Mexico, and Santa Ana, and are, May 31, 1900, occupying all the above stations with the exception of San Fernando and Calumpit.

Thirty-fifth United States Volunteer Infantry.—For the whole of the period mentioned the regiment has occupied that portion of the province of Bulacan embraced within lines drawn from San Miguel de Mayumo to Biacnabato, thence to Norzagaray, to Santa Maria, to Quingua, to Pulilan, to Baliuag, to San Ildefonso, and thence to San Miguel de Mayumo. Headquarters, First Battalion, and band have been stationed at Baliuag, the Second Battalion at Norzagaray, Angat, Quingua, and Santa Maria, and the Third Battalion at San Miguel de Mayumo and Pulilan. Detachments from the several companies have been stationed at San Ildefonso and Biacnabato. The territory included within these lines and adjacent country outside have been well covered by scouting detachments from the posts.

Mobile organizations.—Troop H, Fourth Cavalry, stationed at San Rafael; Troop F, Fourth Cavalry, at Norzagaray; Battery E, First Artillery, and Burr's scouts at Angeles, and the Macabebe scouts at Macabebe, but only part of the time with this command.

MEDICAL ADMINISTRATION FEATURES.

Third United States Infantry.—In the management of the medical affairs of this regiment there are no features worthy of special note.

The numerous stations garrisoned by the Third Infantry and the number of medical officers on duty render the efficient direction of affairs more difficult than if the command were concentrated; the latter would enable me to personally supervise much of the work which, under existing conditions, must necessarily be done on paper. My professional duties, in addition to other duties required of a medical officer, render frequent or protracted absence from my station for the purpose of inspection impossible. The work, however, is progressing in a fairly satisfactory manner.

Sanitation: The work of cleaning the towns garrisoned by the Third Infantry has progressed in a most satisfactory manner considering the nature of the country and the accumulated filth of years, due to the customs and habits of the people.

Water: Good quality, and while many reports of its questionable potability have passed through this office and samples have been sent to Manila for analysis, no report of its evil effects on the men has come to my notice. As far as possible all water used for drinking purposes is boiled and filtered. Water at San Fernando is obtained from an artesian well, located near railroad station, and is of excellent quality.

Faeces: Latrines emptied daily where they are in use and contents buried.

Slops: Removed daily and disposed of as above.

Sleeping arrangements: Troops are comfortably quartered in good buildings, except at Guiquinto and Bigaa, where detachments of Company L are living in tents. Numerous outposts also occupy tents, but these details are subject to frequent changes.

Food: Abundant and of good quality.

Cooking: Good.

Efficiency of the medical officers and hospital corps: Fair.

Thirty-second United States Volunteer Infantry.—There is a regimental medical officer stationed with each battalion. The surgeon with headquarters and first battalion, the captain and assistant surgeon with second battalion, and the first lieutenant and assistant surgeon with third battalion. Reports are rendered daily to the surgeon's office by telegraph, except from Mariveles, which has no telegraphic communication. The surgeon, in addition to Balanga, visits Pilar and Abucay, where no medical officers are stationed. The assistant surgeon at Orani visits Samal and Llana Hermosa, and the assistant surgeon at Florida Blanca visits Porac. The surgeon, as far as he can, inspects the garrisons of the regiment, but owing to the fact that there is no available medical officer to relieve him, this is not done as often as desired. All requisitions for supplies are sent through the surgeon's office.

Sanitation: Towns are inspected by surgeons and post commanders, and natives required to keep yards and streets clean. Towns garrisoned by this regiment are in good sanitary condition at present, and improvements are being made. Quarters are regularly inspected by the surgeons.

Water: Water is as far as possible obtained from rivers and running streams and is boiled and filtered. The water from the rivers and mountain streams is excellent in quality.

Faeces: Sinks are located at the proper distances from the quarters, and the faeces are kept constantly covered with dry earth. Where possible they are located over rivers which are not used for water supply. Dry-earth closets have been recommended for the rainy season where river sinks are not available.

Slops: Garbage is burned, and slops are dumped in river where possible or burned.

Sleeping arrangements: Excellent. The regiment is supplied with cots and the quarters are at least 5 feet above the ground.

Food: Supply good and sufficient. Fresh meat is supplied three times a week from Manila, and bakeries are being built at the principal garrisons.

Cooking: Companies are well supplied with good cooks and the facilities for cooking are excellent.

Any other matter pertaining to the health of the command: Men are kept out of sun as much as possible between the hours of 11 a. m. and 4 p. m. Company commanders have received instructions to have men take care of their feet and bathe them and change stockings often. Bathing facilities in running water are good.

Forty-first United States Volunteer Infantry.—About March 1 regimental hospitals were established as follows: Angeles—headquarters, 16 beds, afterwards increased to 40 beds; Guagua, 10 beds; San Fernando, 10 beds; and emergency hospitals at Calulit and Santa Ana, 5 beds each. Native houses were used for hospitals. Until about May 1 all serious cases, such as typhoid and contagious diseases, were sent to other hospitals, mostly to Angeles. Since that time owing to the increased capacity of the regimental hospital at Angeles and the more or less permanency of stations, nearly all cases are treated at regimental headquarters. Morning report for May 31 shows absent sick, 23; present sick, quarters, 40; hospital, 49.

Medical supplies: Medical supplies, in addition to those brought from Camp Meade, Pa., have been obtained mostly from subsupply depot at Angeles and with comparative promptness in filling requisitions.

Water: The water supply at the various stations has been variable. At most of the stations it has been obtained from wells and has been of doubtful quality. At San Fernando good water was obtained from an artesian well. At Guagua the water supply has been especially poor. The water from the local wells was brackish and could not be used. Water was brought from San Fernando, but this was found impracticable and the supply had to be obtained from a stream several miles distant and brought in bancas. At all the stations the greatest precautions have been taken to boil and filter the water. Guagua has two "Waterhouse-Forbes sterilizers," and Angeles one, which give good satisfaction.

Faces: Earth pits have until recently been used for disposal of faces, being covered twice daily.

Slops: Were disposed of in like manner. Zinc latrines are now chiefly used with removal of contents twice daily.

Sleeping arrangements: The men all have cots.

Food, cooking, etc.: The food has generally been excellent; its cooking variable, depending on the efficiency of the company cooks.

Thirty-fifth United States Volunteer Infantry.—The three regimental medical officers have been stationed, respectively, at Baliuag, San Miguel, and Norzagaray, with detachments of the hospital corps proportional to the needs of the posts. We have had no trained nurses. When Companies G, H, and M established posts at Quingua and Pulilan January 22 and 26, Acting Asst. Surg. Edwin N. Bowen was assigned to duty with these commands. Subsequently (March 18) Company G removed to Santa Maria, and on May 4 Acting Asst. Surg. Leonard P. Bell was assigned to duty with it. The regimental surgeons and the two acting assistant surgeons are the total medical officers now with the command. The hospital corps personnel has embraced the 3 regimental hospital stewards, 3 acting stewards, and an average of 22 corps privates. At the present time 2 acting stewards and 1 private are on detached service, 1 acting steward and 3 privates are sick in hospital. Field hospitals have been in operation at Baliuag, Norzagaray, San Miguel, and Quingua. Sick men from other stations have been sent to these hospitals for treatment. These have been well provided with medical and other necessary supplies.

Medical supplies were formerly obtained by requisition of medical officers at separate posts direct upon the chief surgeon of the department, Manila. After receipt of instructions that this be changed they have been obtained upon requisition of the regimental surgeon for the entire command, and subordinate medical officers have received their supplies from this officer at Baliuag.

As to the transfer of sick and wounded to other hospitals, the instructions contained in Circular No. 6, Headquarters Second Division, Bautista, January 22, 1900, have been generally observed. From the regimental hospitals patients have been transferred to the field hospital, Angeles, or the base hospital, Dagupan, and occasionally to the First Reserve Hospital, Manila, when the nature of the case rendered this advisable, the necessary authority in the latter case being previously obtained. Cases of typhoid fever, remittent malaria, malarial anæmia, chronic diarrhœa and dysentery, surgical affections of the rectum or genito-urinary organs, and surgical cases needing special operation have been sent to the hospitals above named.

The sanitary condition of the buildings used for hospitals has been satisfactory. Before being occupied the rooms and halls were thoroughly scoured and old water-closets cleaned and disinfected and in some cases closed up. The hospitals have been daily policed and kept in good condition.

Drinking water has been obtained from the rivers passing San Miguel, Norzagaray, Baliuag, and Quingua. The water is always boiled before using and generally filtered, the Army field filter, the Maignen filter, and an improvised filter of sand and charcoal being employed.

The hospital faeces and slops have been either carted off to the river along with similar refuse matter from other premises of the garrison and deposited below the point where the drinking water is obtained or they have been disposed of in large earth pits dug in the rear of hospitals to receive them. The deposits in these sinks have been daily covered with dry earth and chloride of lime when required.

Each hospital has had a sufficient number of cots (wire or canvas) for the patients usually on hand. The quantity of bedding has been ample.

Patients unable to use the regular ration have received the benefit of the 40 cents per day allowance for the sick. This allotment has been found to be quite sufficient. The average cost of subsistence for the sick in hospitals has been about 36 or 37 cents per man per day. The kitchens have had all necessary utensils, and cooking facilities have been satisfactory.

POST AND CAMP HOSPITALS.

Third United States Infantry.—Post hospitals have been established and modestly equipped by all medical officers on duty with the regiment; only such cases as require special treatment are transferred to general hospitals. Each medical officer has been provided with two hospital tents complete and held in reserve to be used in case of emergency, ambulances in good condition, and an abundant supply of medicines and surgical dressings.

Thirty-second United States Volunteer Infantry.—The regimental hospital is situated at Balanga, and has a capacity of 16 beds; Second Battalion hospital at Orani, capacity 12 beds; Third Battalion hospital at Denalupijan, capacity 10 beds; company hospital at Florida Blanca, 6 beds; company hospital at Orion, 6 beds; and company hospital at Abucay, 4 beds. The buildings are in good repair and furnished with cots, and in some places mattresses; all have blankets, mosquito bars, pillows, pillow cases, sheets, and all other necessaries for the comfort of the sick. Each post has a building suitable for isolation of contagious cases. Special diet is obtained from the commissary at the different posts.

Forty-first and Thirty-fifth United States Volunteer Infantry.—See under "Medical administration features."

Fourth United States Cavalry.—Has camp hospital at San Rafael.

Battery E, First Artillery, and Burr's Scouts have no camp hospital; all cases are sent to field hospital, Angeles.

MEDICAL SUPPLIES.

Third United States Infantry.—Obtained by requisition on medical supply depot at Angeles; fair supply on hand.

Thirty-second United States Volunteer Infantry.—Good supply on hand for the rainy season. Each surgeon is furnished with all the instruments necessary for performing operations required in the field and in regimental and battalion hospitals. Supplies for all stations in the province of Bataan are shipped direct from supply depot in Manila to regimental hospital at Balanga, where they are packed and shipped to the different garrisons. Supplies for Florida Blanca and Porac are furnished and shipped direct from Second Division hospital at Angeles on requisitions from the regimental surgeon.

Forty-first United States Volunteer Infantry and Thirty-fifth United States Volunteer Infantry.—See "Medical administration."

EFFICIENCY OF DEPARTMENT AND SPECIAL MENTION OF DESERVING MEMBERS.

Third United States Infantry.—Knowledge of administrative duties and paper work among medical officers poor, but improving.

Thirty-second United States Volunteer Infantry.—Standard of efficiency of medical officers serving with this regiment is very high. While many of the men have served scarcely a year in the hospital corps, they have rapidly acquired a knowledge of their duties and have rendered excellent service. Knowledge of administrative work good; knowledge of paper work is fair; efficiency in that direction is increasing. None of the medical officers had any experience in paper work prior to the Spanish-American war.

HOSPITAL THIRTY-FIFTH VOLUNTEER INFANTRY, BAULIUAG, LUZON.

Particular attention and devotion to duty displayed by the following members of the hospital corps in nursing and caring for smallpox cases at this place from February 28 to March 23, 1900: Hosp. Stewards Benjamin Hanson and Theodore F. Knapp and Privates James F. Hammer, hospital corps, and Francis L. Baldwin, Company C, Thirty-second United States Volunteer Infantry, then a convalescent patient in the hospital, and by the following members of the hospital corps in nursing and caring for smallpox cases at this place from April 9 to 15, 1900: Hosp. Steward Theodore F. Knapp and Privates James F. Hammer, Hugh S. Longbottom, and Charles Walsh.

Coolness and systematic action displayed by the following members of the hospital corps in the placing of patients under protecting cover and preparing instruments, dressings, and operating table for immediate use while the regimental hospital was being fired on from different points, in attack on Balanga, April 8, 1900: Hosp. Stewards Hanson and Knapp, and Privates Adam Chart, James F. Hammer, Hugh S. Longbottom, and Charles Walsh.

Hazardous service performed by Hospital Steward Benjamin Hanson, in removing bodies of killed American soldiers from the field, in an ambush made by the insurgents about 4 miles west of Orion, P. I., April 11, 1900.

Coolness and systematic action displayed by Acting Hospital Steward Ivan N. Karlson and Private Harry W. Hutchinson during an attack on Abucay, P. I., May 25, 1900. Acting Hospital Steward Karlson participated in engagement at San Luis, May 17, 1899, at Paranaque, June 10, 1899, at Zapote Bridge, June 13, 1899, and at Bamban, November 11, 1899. Private John Plant participated in engagement at San Luis, May 17, 1899, and at San Fernando, August 9, 1899. Private Charles Walsh participated in skirmish in the foothills about 4 miles northwest of Abucay, May 16, 1900.

Forty-first United States Volunteer Infantry.—The medical officers now on duty with the regiment number 5, in addition to the regimental surgeon, and are all efficient and have shown a willingness and cheerfulness in the performance of their duties. Acting Asst. Surg. John J. Gilhuley, on duty with the Forty-first since January 14, 1900, was especially commended by General Grant for attention to wounded in engagement near Mount Aryat. The hospital corps personnel now numbers 3 hospital stewards, United States Volunteers, 2 acting hospital stewards, and 26 privates. Marcus H. Heldman, the senior, formerly acting steward United States Army, is thoroughly competent and familiar with routine work. The other two were enlisted directly from civil life, and while not as efficient as the senior member are zealous in the performance of their work. The two acting stewards are both most excellent men, competent to fill positions as full stewards of volunteers. The privates are, some excellent, some fair, and others poor. The efficiency of most of them has been excellent, considering the limited time and opportunity they have had for instruction, and although they have had no opportunity to display their efficiency in first-aid action yet, at the post, in the ward, and at any other duties assigned to them at the hospital they have displayed knowledge and willingness to do their part. Private Walter F. Callahan, in an engagement on February 2, 1900, in which one man was mortally wounded, improvised a litter of his own clothes and transported the patient very carefully and ably. Private George D. Dersh, having been put in charge of a smallpox patient, nursed him bravely and carefully to the end.

Thirty-fifth United States Volunteer Infantry.—Medical officers and members of the hospital corps have been efficient, and, as a rule, attentive to their duties. Recently the hospital corps has suffered several losses by transfer, assignment to duty on detached service, transfers by sickness, and one discharge by general court-martial, without corresponding gains, so that for months past the working strength of the corps has been at a minimum.

Medical officers have shown good knowledge of their administrative duties and paper work, barring occasional errors due to inadvertence or to misunderstanding of instructions. The writer believes that faithful efforts have been made to keep the paper work up to date and to forward the periodical reports at the proper times.

Since January 1 the only actions in the field have been unimportant skirmishes between small scouting detachments of troops and bands of roving insurgents or ladrones. These scouting parties have generally been accompanied by one or more members of the hospital corps, a hospital steward, or one of the surgeons. Men taken sick or wounded in the field have been removed by the corps attendants or their comrades to the nearest hospital for treatment, and after recovery they have been returned to their proper commands. So far as the writer is aware, there have been no noteworthy incidents of personal bravery or hazardous service on the part of the medical officers or members of the hospital corps. Opportunities for distinguished service of this kind have been lacking. There are three serviceable ambulances with the regiment.

PREVAILING DISEASES.

Third United States Infantry.—Since joining the regiment February 10, 1900, nothing more serious than the ordinary intestinal troubles—diarrhea, acute or chronic, and dysentery of a mild type—malarial fever, apparently recurring in men who had seen service in Cuba and were exposed more or less to favorable conditions for its redevelopment, and with my immediate command an unusual amount of venereal diseases. As to the intestinal troubles, no one cause can be held entirely responsible for their production. Indiscretion in eating, especially the various tropical fruits, no doubt is responsible for a major part of the acute diarrhea. Dysentery, in all probability, is largely due to the wide variations in temperature, night and day, and fatigue diminishing the resisting power of the tissues and allowing infection to take place. Mild cases, catarrhal form, are no doubt a continuation of a neglected acute diarrhea. The regiment at the present time seems particularly free from any serious intestinal troubles, except several cases which have continued on to the chronic state, and, in my opinion will not recover in this climate under the present conditions. Of malarial fevers and venereal diseases, opinion as to the cause is not necessary. Of the acute infectious diseases, one case of smallpox developed at Malolos in February, was transferred to Second Division hospital, Angeles, and died there three days later. The entire command at that post was revaccinated. No other case developed. With this exception the regiment has been entirely free from this type of disease. The command has been affected with the usual amount of dhobie itch and sore feet. Several cases of hernia have been transferred for operation.

Thirty-second United States Volunteer Infantry.—Malarial fever has been the prevailing disease; dysentery and diarrhea have been next in order. In January dhobie itch was prevalent, but it has diminished of late. Diarrhea has probably been caused by overeating of fruit and, especially on marches, by drinking water that has not been boiled and filtered. The same may be said in regard to dysentery. Malaria here is caused by the large amount of territory subject to tide water. After the ebb the ground is covered with rank decaying vegetation. The cases of smallpox were caused by the fact that there were quite a number of native children affected with the disease during February and March. The command has been repeatedly vaccinated and all but one of the soldiers affected had good scars.

Methods of caring for sick and wounded in the field, especially during action: A hospital corps man is sent with each scouting party or detachment, supplied with necessary first-aid packets, medicines, instruments, and the men are furnished with first-aid packets. Each company is supplied with litters. A medical officer accompanies the larger expeditions. There are ambulances stationed at each post, except Pilar, Samal, Llana Hermosa, and Mariveles, but they are only available short distances from the main road, owing to the character of the country. Sick and wounded are brought to the nearest ambulance station and from there transported to the nearest hospital.

Forty-first United States Volunteer Infantry.—The most prevalent disease has been malaria, both pernicious and benign. In reference to the cases of malaria I wish to call attention to the great value of hypodermic medication. I have used this method exclusively and with the most gratifying results; many of the cases were apparently hopeless when first seen. I do not think this method has received the consideration it deserves by the majority of the medical officers on duty in the Philippines. In my opinion much of the dysentery and diarrhea, diagnosed as such and treated purely as such, are cases of pernicious malaria in which blood examinations would reveal the nature of the trouble and in which treatment hypodermically for malaria would cause the disappearance of the dysentery or diarrhea. I have observed this condition in so many cases that it can hardly be mere coincidence. My only plea for this digression is to emphasize the great importance of blood examinations in all cases of dysentery and directing the treatment to the probable cause, malaria. Except as above stated as coincident with pernicious malaria there has been comparatively little dysentery and diarrhea. When speaking of pernicious malaria, I use the term in the broad sense of cases in which the malignant parasites are found and not in the very restricted sense of acute attacks, such as cerebral.

Thirty-fifth United States Volunteer Infantry.—The prevailing diseases have been malarial fever, diarrhea, and dysentery, acute and chronic. Typhoid fever has not occurred to any great extent. The round worm (*Ascaris lumbricoides*) has been noted among the men with greater frequency than one expects to find in an adult population. No smallpox case has occurred among the troops. Venereal disease has been comparatively infrequent.

Malarial disease (intermittent, remittent, pernicious, and cachectic) has constituted 48 per cent of the cases in hospital and quarters at Baliuag, 51 per cent at Norzagaray,

62 per cent at Quingua, and 71 per cent at San Miguel. The intermittent tertian type has predominated. The cause doubtless is to be found in the season and in the necessary exposure to the sun on the march. January, February, March, and April, I am informed, are the months of the greatest prevalence of malarial disease in the Philippines. Exposure to the heat and the injudicious use of drinking water from native wells or shallow streams while on march have doubtless been important factors in the production of malaria, the diarrheas, and the few cases of typhoid fever.

DEPARTMENT OF SOUTHERN LUZON.

REPORT OF MAJ. J. L. POWELL, SURGEON, UNITED STATES ARMY, CHIEF SURGEON, DEPARTMENT OF SOUTHERN LUZON, DATED MANILA, JUNE 1, 1900, AND ADDRESSED TO THE CHIEF SURGEON, DIVISION OF THE PHILIPPINES.

In response to letter from your office of April 12, I have the honor to present a report of the operations of the medical department of the First Division, embracing the period from January 1 to May 30, 1900.

Practically the narrative begins on January 4, when Maj. Gen. J. C. Bates assumed command, in consequence of the death of the lamented Lawton. At this time the division numbered approximately 23,000 men, the greater portion of which was resting in camp after the severe ordeal through which it had passed in the campaign that had just come to a close in the northern and central portions of Luzon. Preliminary steps had already been taken for the mobilization, equipment, and concentration of an expeditionary force of six regiments of infantry and two of cavalry for the invasion of the southern provinces of Cavite, Laguna, Batangas, and Tayabas, territory that up to this time had been in exclusive possession of the insurgents. The advance column under Brigadier-General Schwan, consisted of the Thirtieth and Forty-sixth Infantry, nine troops of the Eleventh Cavalry, and five troops of the Fourth Cavalry. What was termed the marching column was commanded by Brigadier-General Wheaton, and was composed of the Fourth, Twenty-eighth, Thirty-eighth, and Forty-fifth Infantry.

The administrative features of these two commands during the active stage of the expedition were among the most important that have taxed the resources and energy of the medical department, individually as well as collectively, and in the results achieved have demonstrated its capacity to meet almost any emergency, while out of it all have been derived most valuable lessons for application upon future occasion.

To Schwan's column was assigned Maj. H. S. T. Harris, United States Volunteers, as brigade surgeon. Maj. Ira C. Brown, United States Volunteers, was the brigade surgeon of Wheaton's command; but it had hardly gotten into motion when Brown was relieved for other duty and Maj. H. P. Birmingham, surgeon, United States Army, assigned to the vacancy.

Seven four-mule ambulances were ordered to report for duty with the advance column, six with the marching column.

Every effort was made at this office to insure the complete equipment for each regiment or fractional part thereof when operating independently, as to medical and surgical appliances and personnel of surgeons and hospital corps men prescribed by existing orders and regulations and the Manual for the Medical Department. A supplementary force of twelve Chinos to each regiment was employed as additional litter bearers, and well they served their purpose, especially when wheel transportation was impracticable, which was constantly the case, owing to the impassable roads and difficult character of the country in the theater of operations. But the regiments were seldom handled as a unit, the detached parts being often separated by long distances, making it the more difficult to divide up in a way to meet every contingency a complement of medical officers, medical and surgical equipment, and personnel of the hospital corps, that under ordinary conditions would have been fully adequate for any exigency.

None of the prescribed classical or tactical dispositions were in any way applicable, but every movement, great or small, brought along with it its quota of sick, wounded, or exhausted, and furnished an extemporized basis, so to speak, for the exercise of every faculty of ingenuity possessed by the surgeons and hospital corps men in improvising measures to care for the disabled and to transfer them to some place of safety. In the majority of instances where engagements occurred the sole means immediately at hand for meeting the demands of the casualty list was limited to the hand stretchers or litters, the hospital corps and orderly pouches and the first-aid packages, and such other small quantities of dressings and essential medicines as could be taken on the persons of the Chinos or hospital corps men, but even with this limited equipment no notable instance of suffering was recorded, and in due

time all cases requiring protracted medical or surgical treatment were conveyed to eligible points, many of which eventually became sites of hospitals, regimental or base, of more or less permanence, according to the suggestions of the military situation.

Suitable buildings were to be found in most of the towns. There is scarcely one of any size without its convent, and this in most instances being well adapted for hospital purposes, was invariably used as such. In this way, as the insurgents were driven out of the provinces cited and our troops took up permanent locations, each station soon found itself possessed of a hospital fully equipped for every necessity.

The base hospitals designated from this office were located on the lake shore and on the seacoast. Of these there are Calamba, on the Laguna; Bacoor, Batangas, and Lucena, on the seacoast. They all constitute a base of medical supplies for the interior stations, and each surgeon in charge is to this extent a supply officer.

The Calamba Hospital dates from February 3 last, and the history of its inception is embodied in the report of an inspection made by me to the adjutant-general, First Division, Eighth Army Corps, April 4, 1900, a copy of which I had the honor of forwarding at the time, by your request, to your office. It is admirably equipped, well situated from a military point of view, and can be expanded to accommodate about 200 patients, though at this writing there are about 170 cases. It has a competent force of hospital corps men and eight trained female nurses. Maj. George H. Penrose, brigade surgeon, United States Volunteers, is in charge. Bacoor, originally a small brigade hospital, is the focal point for the commands in Cavite province, as is Calamba for Batangas, and was established by Major Penrose about July, 1899. It has, however, been enlarged and improved, and, like Calamba, is equipped for any sort of cases, medical or surgical. It, too, is a transformed convent building, and is now in charge of Maj. W. P. Kendall, brigade surgeon, United States Volunteers. Farther down the seacoast is Batangas, situated across the neck of land about 40 miles from Calamba. It is a sort of combination regimental and base hospital, and Maj. J. D. Glennan, surgeon, Thirty-eighth Infantry, is in charge. A municipal building has been fitted up for a hospital, and there is ample storage room for supplies. At Lucena is a hospital alike in character to those described, and although but recently established it is assuming a shape under the management of Maj. J. R. McDill, surgeon, Thirtieth Infantry, that will make it equal in importance and efficiency to those that have been mentioned. At Santa Cruz, on the Laguna, is also a combination regimental and base hospital, which is admirable in all its appointments, and is under the efficient administration of Maj. F. A. Winter, surgeon, Thirty-seventh Infantry. It is a good type of a number of buildings at other places that are used for similar purposes. For a more detailed description of it I refer to Major Winter's report and to the photograph that accompanies it.

At all interior stations where troops are located, as at Tayabas, Lucban, Majayjay, San Jose, Lipa, Taunaun, San Pablo, Santo Tomas, Indan, Silang, Dasmarinas, Imus, and many other points with small garrisons or detachments, provision is made for the proper care of the sick and wounded. The equipment in these instances ranges from a mere dispensary, with an acting hospital steward or private of the Hospital Corps, to a complete regimental outfit, its proportions being determined by the size of the command, its distance and accessibility to some more central, amply supplied, and fixed strategical point. The number of sick and wounded at these interior hospitals is limited by orders from this office, the overflow being taken by ambulances to the bases, from which again, in case of crowding, they are brought by water to the hospitals in this city. In anticipation of the rainy season, when land transportation for wheeled vehicles is almost out of the question, medical officers at stations likely to be permanent were ordered to prepare requisitions covering a period of six months, and to have the stores on hand by May 15. This was done according to order.

A comparative state of repose was beginning to succeed the active hostilities that had prevailed in that section, and the troops were settling themselves in more or less permanent abiding places, when another demand was made upon the First Division, Eighth Army Corps, for an expeditionary force, destined for the suppression of insurrectionary demonstrations in the Camarines, a province near the southern extremity of the island of Luzon. This was composed of the Fortieth and Forty-fifth Infantry, and Company G, Thirty-seventh Infantry, with four mountain guns and a detachment of engineers, taking its departure from Manila on February 15, and going by sea to its destination. This brigade was under the command of Brig. Gen. James M. Bell, United States Volunteers, and was known as Bell's Expeditionary Brigade. Arriving in the bay of San Miguel on the east coast of the island, a combined movement was made resulting in the landing and quick possession of the country bordering on the bay, and with the loss of 1 officer killed and about 10 men wounded, reports of which were forwarded in due course to your office.

Maj. Thomas C. Raymond, United States Volunteers, was surgeon of the Fortieth, and Maj. M. W. Ireland, United States Volunteers, of the Forty-fifth Infantry, both men of experience, ability, and energy. Their equipment was limited to the prescribed allowance for troops operating in the field, but it was ample, as a six months' supply was issued. Major Raymond being the ranking officer, assumed the duties of brigade surgeon, and while he was in charge performed them with zeal and excellent judgment. While the number of surgeons and hospital corps men designated to accompany this column was considered sufficient to meet every requirement, the rapid multiplication of small detached commands in the territory in point made the demand for divided medical attendance far in excess, not only of the regulation allowance, but of the additional supernumerary force that it was deemed expedient to assign to duty with the command. The scattering military operations by small bodies of men have created a call for surgeons which it has been impossible in every instance to meet, and there is every indication that as the troops become more permanently located the numerous encampments will increase rather than diminish the already existing necessity for an addition to the number of surgeons which have been allotted to this military department.

At Nueva Caceres the nucleus of a brigade hospital was started by Major Raymond, but in the absence of any wire communication with these headquarters, and owing to the length of time it requires to communicate by sea, it is impossible to keep pace with the daily progress of events in that district. The conditions are about the same, however, as those that existed in Cavite, Laguna, Batangas, and Tayabas, and by a process of evolution the organization and equipment of the medical department in the Camarines will in time, no doubt, settle upon about the same lines as those now prevailing in those provinces.

On March 20 the Fortieth Infantry was relieved from duty in the Camarines and sent to the island of Mindanao, the Forty-seventh Infantry taking its place, and between April 23 and June 1 two squadrons of the Eleventh Cavalry, which had been stationed in the province of Cavite, were added to the force commanded by General Bell.

Sanitation and health of the command.—Every possible precaution has been taken by the medical department looking to the preservation of the health of the troops of this division. Medical officers have been enjoined from this office to familiarize themselves with the instructions on camp sanitation contained in the Manual for the Medical Department of the Army, edition of 1899, and to be more than ordinarily persevering in their recommendations relative to the boiling of all drinking water and the care of the sinks.

Where instructions embracing almost every duty of administration and others that properly come within the province of the army surgeon are so complete, and embodied in such concise and convenient form as they are in this little manual, it has been thought the work of publishing from day to day a multitude of orders and circulars from the office of the chief surgeon of the division, expressing about the same thing, would be nothing less than superfluous; and to the end that simplicity, which is believed to be the wisest and best mode in the attainment of every end, might be preserved, it has been the endeavor to place in the hands of every medical officer of the division one of these little books. To in a measure reenforce the manual as to special conditions existing in the Philippines, the chief surgeon of the Eighth Army Corps prepared a most admirable circular (13), which was published from headquarters of the department on February 22, 1900.

With these two, it is believed that nothing has been left undone to educate the most inexperienced among the medical officers of the command to a full appreciation of their responsibilities and to a proper performance of their duties, administrative as well as professional. To each of them was addressed the following letter, dated March 7, 1900, accompanied by the circular cited:

"The inclosed circular is for your information and guidance. Its provisions in every particular will be strictly complied with. In conjunction with the Manual for the Medical Department of 1899, a copy of which can be obtained on application at this office, it should be made the *vade mecum* of every medical officer of the division, and no departure from the instructions and regulations embodied in the two will be permitted to pass unnoticed. Upon receipt of the circular you will at once report the fact by wire to this office."

Butswithal, the effort to prevent an outbreak of typhoid fever at certain points has not been entirely successful. At Paete, on the lake shore, in the province of Laguna, where there was one battalion of the Forty-second Infanty, it made its appearance in the latter part of March, and soon assumed the proportions of an epidemic. In all about 23 cases were verified by the Widal and other tests, but it is gratifying to report that by the application of vigorous sanitary measures, which unhappily appear

to have been neglected too long, its progress was quickly checked, and at this writing, June 1, the command is practically free from the disease. A beautiful mountain stream near which the troops were located and from which water for all purposes was obtained, courses through the village, and by its clear and sparkling features, was suggestive of great purity, a fact that put both officers and men off their guard, and was the cause of a neglect to subject to the boiling process all the water used for drinking purposes. It was discovered that this stream passed by some nipa huts farther up, and it was suggested that there was the source of infection. But this theory was not susceptible of positive proof and the opinion is held by some with equal reason that the germs of the disease may have been brought from some focal point to which the command had been exposed in the active operations in which they had been engaged just prior to their encampment at Paete.

In addition to the measures adopted to correct the existing evil, two Waterhouse-Forbes sterilizers were shipped to that point for the use of the command. As a precautionary measure a number of these machines have been supplied to other points as well where it seemed probable that the drinking water was not pure and wholesome, but the supply of these machines is not equal to the demand throughout the military department. The whole history of the outbreak proves not only the value and importance of the sanitary measures recommended for the camp by the medical department, but the criminality of those in authority who neglect their enforcement.

At San Pablo, in the province of Batangas, where a battalion of the Thirty-ninth Infantry has been stationed, a serious outbreak of illness has recently occurred among the troops, chiefly of a dysenteric character, although three cases of typhoid fever were verified by Lieut. R. P. Strong, assistant surgeon, United States Army, the pathologist, on a recent visit he made by my request, to the base hospital at Calamba, to which point the sick are transferred from the inland stations in that section. At San Pablo, too, where the same ignorance of or indifference to proper health precautions prevailed, the situation was soon relieved by instructions from this office and the commendable efforts of the district surgeon.

The conditions that prevailed at Paete and San Pablo were the occasion of the following order, framed in this office and recommended to the department commander, by whom it was published to emphasize and enforce the sanitary instructions that had been given to the regimental surgeon by the chief surgeon of the department.

CIRCULAR } HEADQUARTERS DEPARTMENT OF SOUTHERN LUZON,
No. 8. } *Manila, P. I., May 29, 1900.*

Owing to a recent outbreak of typhoid fever and dysentery of epidemic form among the troops at two of the stations in this department, which it is believed was due entirely to the neglect of well-known sanitary measures, the department commander takes occasion to call the attention of commanding officers to the importance, under all circumstances, of exercising a rigid supervision over the water supply, from whatever source obtained. It is known that typhoid fever and dysentery, the great camp scourges, are water-borne diseases, and inasmuch as the germs of the diseases are destroyed or rendered innocuous by a few minutes' boiling, it is ordered that all water used for drinking purposes be subjected to that process and that the use of any other be forbidden.

In order to carry out this measure, a system of daily inspection of drinking water and canteens will be instituted in each company, and the unnecessary use by any member of the company, of unboiled water for drinking purposes will be regarded as disobedience of orders and treated accordingly.

By command of Major-General Bates:

ARTHUR L. WAGNER,
Assistant Adjutant-General.

Diarrhea, dysentery, and the different types of malarial manifestations have been the predominent factors in producing inefficiency and disability in the division, typhoid, the great camp scourge, not figuring, except in the two instances cited, to give alarm or showing any tendency to get beyond perfect control by proper sanitary measures.

Just here I wish to record my approval and commendation of the portable dry earth boxes now issued from the quartermaster's department. As an improvement upon the old-fashioned and opprobrious camp sink, they stand preeminent. They are very light and convenient, and the amount of labor necessary to empty them at proper intervals and keep them clean is small compared with what is required to keep a sink in proper shape as a sanitary device. Besides, the boxes constitute by all odds, a much more effective means from a sanitary point of view of disposing of the excreta.

At stations where it has been practicable to send it, quicklime, in quantities sufficient has been supplied, to be used in such a manner as might be considered most effective.

It is believed that an analysis of the tabular reports will show that the amount of sickness, all things considered, has not been excessive. Smallpox has prevailed here and there, contracted primarily from the natives, among whom it appears to be endemic, but a rigid enforcement of vaccination regulations is required, and in the First Division, now the Department of Southern Luzon, it has been held well in check. With virus obtained from the Manila Board of Health, and purchased out of the civil fund, the medical officers of the command, under instructions from this office, and without making the measure compulsory, are doing most valuable work in extending its benefits to the native population.

The facilities for cooking for the sick while on the march have been primitive, but whenever there was transportation to take them, both food and mess chests have been available, and at every point where there was a stop long enough to justify the organization of a hospital, even on the smallest scale, the 40 cents per day fund for each patient was authorized and purchases made of food from the commissary department, or of articles from the natives, such as eggs, chickens, etc.

Department of Southern Luzon.—The First Division, Eighth Army Corps, continued its official existence up to April 7, 1900. On that date, by General Orders, No. 1, headquarters Division of the Philippines, certain military departments were created and their bounds defined. The Department of Southern Luzon was made to include all the territory from a line drawn east and west across the island a short distance north of the Pasig River to the Straits of San Bernardino to the south, and east and west between the Pacific Ocean and China Sea, including all islands adjacent thereto. By the same order I was assigned to the department as chief surgeon.

The character of the operations that had preceded this division into military departments had been very much in the nature of a "mix up," so that no well-defined lines could be drawn marking off brigades, either by organizations or territorial limitations. In consequence of this there was an unavoidable incompleteness in the organization of the medical department, which made it necessary for nearly all the regimental surgeons to report direct to this office, thus imposing upon it an amount of work and a sense of undivided responsibility by no means light.

It is true that the First Brigade, under Brig. Gen. R. H. Hall, United States Volunteers, owing, it is presumed, to its location and the line it had to guard, preserved its autonomy, but this was the only exception. To this command Maj. W. B. Banister, surgeon, United States Volunteers, had been assigned as brigade surgeon, and the efficiency, zeal, and ability he has displayed in the performance of his duties are deserving of the highest praise.

In natural sequence to General Orders, No. 1, headquarters Division of the Philippines, defining the departments, came General Orders, No. 2, headquarters Department of Southern Luzon, defining the districts with reference to natural boundaries, and assigning certain officers to command. The occasion was opportune for the further organization of the medical department, as expressed in the following order of April 19, 1900, the draft of which emanated from this office:

The following medical officers are, upon recommendation of the chief surgeon of the department, assigned to duty as chief surgeons of the several districts in this department:

To the first district: Maj. W. B. Banister, brigade surgeon, United States Volunteers.

To the second district: Maj. George H. Penrose, brigade surgeon, United States Volunteers, in addition to his present independent duty as commanding officer, division base hospital at Calamba.

To the third district: Maj. Richard W. Johnson, surgeon, United States Army.

These officers will report to their respective district commanders for duty.

The functions of administration will devolve largely upon the chief surgeons of districts, who will, at all times, keep themselves in close touch with the office of the chief surgeon of the department. They will constitute the channel of communication between him and the regimental surgeons, in all matters, except when emergency imperatively requires a departure from this rule. All reports and papers of a routine character required of the regimental surgeons must be rendered with promptitude, and to this end telegraphic communication should be utilized freely. This applies particularly to the weekly sick report, forwarded by wire to the chief surgeon of the department, for the information of the commanding general.

It is expected that the chief surgeons of districts will lose no time in putting the machinery of their offices in smooth running order in every detail comprehended in Regulations, the Manual for the medical department, and in Circular No. 13, Headquarters Department of the Pacific and Eighth Army Corps, February 22, 1900. Their

good judgment, energy, and efficiency should insure order in administration and promote the well-being and health of the command, and, to this end, periodical inspections of the personnel and equipment of the medical department, and of the sanitation of the camps, constitute an important part of their duties.

By command of Major-General Bates:

ARTHUR L. WAGNER,
Assistant Adjutant-General.

Where fidelity to duty has been so universal among the surgeons and personnel of the hospital corps, both on the march and in the camp, whether caring for the sick under the enemy's fire, or in the safer precincts of the hospital out of rifle range, it would seem almost invidious to single out one, more than another, for special commendation. Of Maj. H. S. T. Harris, however, it is but just to make favorable mention for his energy in the trying position he held while chief surgeon of Schwan's expeditionary brigade.

In Major Harris's report, which is herewith appended, attention is respectfully invited to his remarks relative to the gallant conduct of Lieut. E. D. Sinks, assistant surgeon, Thirty-seventh Infantry, while dressing the wounded under fire.

The reports of Maj. W. P. Kendall, brigade surgeon, United States Volunteers, on the Bacoor Hospital; that of Maj. J. D. Glennan, surgeon, Thirty-eighth Infantry, on the Batangas Hospital; that of Maj. F. A. Winter, on the regimental hospital of the Thirty-seventh Infantry at Santa Cruz, and that of Maj. George H. Penrose, on the base hospital at Calamba, are also appended and speak for themselves.

Since the campaign by Schwan's and Wheaton's expeditionary brigades came to a close, there has been a gradual reduction in the number of troops that formerly composed the first division, in consequence of the demands that have been made upon it for service in the southern islands. At the present time the aggregate strength of the forces in the Department of Southern Luzon does not exceed more, perhaps, than 16,000 men.

REPORT OF FIELD HOSPITAL, SANTA CRUZ, LUZON, BY MAJ. F. A. WINTERS, SURGEON, THIRTY-SEVENTH INFANTRY, UNITED STATES VOLUNTEERS, TO THE CHIEF SURGEON, DEPARTMENT OF SOUTHERN LUZON, DATED MAY 14, 1900.

This hospital may be considered a product of Schwan's expedition into Laguna Province, which had its ending at Santa Cruz on January 23, 1900, so far as concerns operations of consequence.

It was established under the direction of Maj. H. S. T. Harris, brigade surgeon, as a field hospital, and has been in active operation as a 60-bed hospital since February 10, 1900. I took charge on February 17. I at once secured the building formerly the city hall of Santa Cruz, as it was well adapted to the purposes of a hospital, though in need of repairs, having suffered like other public buildings during the insurrectionary period. It is a large, airy, cool building, and the front room, accommodating about thirty patients, makes an ideal ward for acute cases. Adjoining this is a small room with eight beds for officers and surgical cases, with an alcove well adapted for use as an operating room. Two smaller wards for officers and a large squad room complete the room features, while a large hall, extending almost the entire length of the building, answers as a dining room. The kitchen is roomy, supplied with a large army range, and has convenient storerooms. A back porch is a convenient adjunct to the kitchen and very suitable for the installation of the Waterhouse-Forbes sterilizer.

Sick men have been received at this hospital from most of the regiments operating on the south lines—the Fourth and Eleventh Cavalry, and the Twenty-ninth, Thirtieth, Thirty-seventh, Thirty-ninth, and Forty-second Infantry. An excellent equipment was speedily obtained. Drugs have been abundant and generally of good quality. The commissary and the surrounding country have provided articles for special diet. Vegetables and all kinds of produce have been abundant, and the allowance of 40 cents a day, with a good hospital fund, has made it possible to feed the sick properly. The most signal need has been ice. I am now procuring it in small quantities from Manila through the post exchange. Malted milk and evaporated cream are the most generally employed articles of special diet. Fresh milk is not obtainable. I have never had a complaint from patients concerning the dietary, and I think they live as well as at any hospital in the United States.

The hospital corps as a rule cooperated with and assisted me in my efforts to maintain a scrupulously clean and orderly hospital. The force of men, with the aid of several Chinese laborers, has generally been adequate, and some of the enlisted force have shown marked ability and proficiency as nurses, etc. The men are required to

FIELD HOSPITAL AT SANTA CRUZ, LUZON.

attend reveille roll call. No man has been tried by general court-martial, though there have been a number of cases of summary court trials. The number of hospital corps men has averaged 18, generally sufficient.

The earth-closet system is used and the receptacles are emptied into the river below the town after thorough disinfection of the contents. It is a fact that but one case of typhoid fever developed in Santa Cruz, and even in this case it is probable that the infection came from an outside source.

There have been treated in this hospital 518 patients. Of these 23 were surgical and 495 medical cases. All indications for surgical intervention have been met and the results have been uniformly good. This hospital, in addition to serving as a base hospital for the troops in this vicinity, has also been a central point for supplies to Paete, Pagsajan, Magdalena, Majayjay, and Lucban; large quantities of drugs have been sent to these points at different times.

In conclusion, I desire to express my thanks to you for your helpful cooperation in the effort to make this hospital a creditable one and a suitable place for the acutely ill in this section of the department.

REPORT OF MAJ. GEORGE H. PENROSE, SURGEON, UNITED STATES VOLUNTEERS, ON THE BASE HOSPITAL AT CALAMBA, DEPARTMENT OF SOUTHERN LUZON, DATED MAY 8,1900.

This hospital was opened February 5, 1900, on which date I arrived in Calamba with 2 acting hospital stewards and 15 privates of the hospital corps, finding Acting Assistant Surgeon Macbeth awaiting me. In this town of 10,000 inhabitants there was one large convent that had been used by the Spaniards as barracks. This building, by tearing down and putting up partitions and completely renovating with scrubbing brush and whitewash, was made into two large wards holding 25 patients each, besides a room at the east end to accommodate the hospital corps. The front of the building was partitioned off into a dispensary and operating rooms, with a good-sized dining room and kitchen at the rear. A second house 200 yards away was made into quarters for female nurses, surgeons, and sick officers.

I brought with me from the medical purveying depot in Manila everything that was necessary to establish a base hospital. The hospital throughout is equipped with white enamel beds, woven-wire mattresses, and a perfect equipment for the operating room. In fact, everything necessary to properly open and maintain such a hospital as this was intended to be was provided. The total capacity is now 105 beds, but arrangements are being made to increase this number.

Wounded are at once brought to this hospital from all outlying stations in ambulances or by boat, as the hospital is only a short distance from the shore of the Laguna de Bay. Sick are transferred by the same method, and from this hospital they are sent to one of the reserve hospitals in Manila if their condition becomes chronic. On March 17, 7 contract female nurses reported to me and on the 21st 2 more, making 9 in all. Each ward has one or two trained nurses who with the hospital corps men attend to the sick. The trained nurses have direct charge, the men acting as assistants. One trained nurse has charge of all special diets, personally seeing to their preparation and serving; another has charge of the operating room. The discipline of the men at this hospital has been excellent. Their willingness and intelligence is deserving of the highest commendation. The attention to duty and the educated skill of the female nurses since joining this station has been everything that could be desired; the help that they have given to the seriously sick and wounded has demonstrated what a boon they are to the army. The 40 cents a day allowed by General Orders 182, Adjutant-General's Office, provides every delicacy, including chicken, fresh eggs, fruit, and lemons, everything that the sick may have. It is sufficient for ordinary demands.

For the most part, all troops are now quartered in native houses or shacks. The drinking water throughout the island is universally contaminated, and should never be used without boiling. While much has been done to procure boiled water for drinking purposes, I am of the opinion that the company officers do not pay enough personal attention to this essential point. Some surgeons have been negligent in informing commanding officers concerning the contamination of streams, or the commanding officers have not acted upon the advice. The result has been sharp, but short, outbreaks of bowel trouble, even to typhoid fever. In every instance, however, the trouble has been promptly met and the disease eradicated to a very large degree. The incessant scouting made necessary by this guerrilla warfare, much of which has to be made at night, is conducive to sickness. During these marches the men will drink of any and all water that they come across, and bowel trouble is the result. This may well be called the unavoidable sickness, but the fact of allow-

ing men in the more permanent stations to drink impure water is to be deplored. Constant attention to the hygienic conditions of camps, the introduction of the Waterhouse-Forbes sterilizer, and the general use of the dry-earth closets are fast reducing the sick list to a minimum.

REPORT OF MAJ. W. P. KENDALL, SURGEON, UNITED STATES VOLUNTEERS, ON THE BRIGADE HOSPITAL AT BACOOR, TO THE CHIEF SURGEON, DEPARTMENT OF SOUTHERN LUZON, DATED MAY 5, 1900.

This point was selected as the site for the base hospital for the troops operating in Cavite Province, and was opened on or about July 22, 1899, by Maj. George H. Penrose, brigade surgeon, Second Brigade, First Division, Eighth Army Corps. It is situated directly upon the shores of Manila Bay, distant 3 miles from Cavite Nueva by water, and about 12 miles from Manila by water and 14 by land. It is connected with Manila by boats, which run three times daily, while a good turnpike connects it with the same point by land. It is the shipping point for all stores and supplies for the interior of Cavite Province, with which it is connected by roads, good in the dry season. Being upon the shore, the ground slopes toward the bay and is well drained. The hospital is situated in the wing of the church of the town of Bacoor, and though this church had been practically destroyed by the ravages of time and the artillery fire of successive, though not always successful, campaigns, it has been made habitable by the restoration of the roof, part of which is of nipa, the rest of corrugated galvanized iron. The numerous openings in the walls, due some to absent window frames, others to effective gun fire, serve for ventilation. The worst of these have been repaired and the protection furnished is all that can be desired.

The hospital consists of one ward in the building mentioned and two tent wards. The building accommodates 40 patients, the tent wards 85; the latter can be considerably expanded in case of necessity. These tent wards are all floored and framed, the floors 18 inches from the ground and connected with the hospital proper by board walks, thus securing communication with the hospital in the most inclement weather. The Hospital Corps is housed in tents, which, like the wards, are framed and floored. As these tents are in perfect condition and are all supplied with a fly raised from the tent proper 4 inches at the ridge and about 12 or 15 inches at the eaves, which method gives a good air space, they are very comfortable even in the hot weather, and are preferred by the men to the building.

The building furnishes, besides the ward, rooms for medical supplies and stores, a dining room for the patients, kitchen, operating room, and rooms for the medical officers. The wards are supplied with either field cots or cots having woven-wire mattresses, which serve their purpose well while in repair; they are, however, easily broken. Mattresses are, as a rule, not used, the patients finding it cooler without them. The patients are generally supplied with pajamas, which they wear day and night, seldom requiring other covering, so that both blanket and sheet, though furnished, are seldom used.

Food supplies are received from both the Commissary Department and the surrounding country, fresh beef of excellent quality being furnished seven or eight times in ten days. As there is no milk in the country, this is furnished in the form either of evaporated cream or Australian milk; both give satisfaction, but the latter is preferred. Eggs are generally obtainable. Fresh fruit, bananas, and mangoes abound in their season. They are, however, especially the mangoes, not cheap. Watermelons of a poor quality also abound; cantaloupes are poor.

Water is supplied in three ways—by wells, seldom used except in case of necessity; by two large cisterns, together having a capacity of 16,200 gallons, and by distilled water, brought daily by the Quartermaster's Department from Manila. The two latter are of excellent quality and the supply ample. Ice is purchased at a cost of 1 cent per pound, and the supply is ample.

The 40 cents per capita per diem allowed for the subsistence of the patients has been found sufficient in all except the rainy season, when prices, especially of eggs and chickens, are greatly advanced.

Bathing facilities are furnished both by the bay—distant 100 yards—to those able to avail themselves of it, and by the tub and sponge baths for those less able.

The latrines are of the dry-earth variety, emptied daily into the bay. They are cared for by native labor. Waste from the kitchen is similarly disposed of.

The laundering for the hospital is done by native labor at a cost of 1 cent per piece, gold.

The operating room is supplied with every convenience necessary to good work, and though slight improvements might be suggested they are more in the nature of reenforcements than actual necessities, as the quality of work done goes to prove.

Large operations, such as amputations of the thigh, for the radical cure of hernia, for appendicitis, etc., have been done with uniformly good success. Many natives apply for assistance, although at first they were unwilling to submit to operative procedures. That they are learning to trust the "Americanos" is an undoubted fact.

The cooking is done by members of the Hospital Corps, and is perfectly satisfactory. When supplies approved shall have arrived, the dining room will be well equipped with all that is requisite.

So far no female nurses have been asked for, as the accommodation for them is not good. The nursing has been done by members of the Hospital Corps. It is hardly to be expected that this service could be equal to that of the professional, yet nothing but words of praise can be spoken for what has been done.

An ambulance service is maintained between the hospital and all interior points, with which the hospital is connected by wire, and ambulances are stationed at the principal places, leaving nothing to be desired under present conditions.

This morning's report showed 21 hospital corps men present for duty, together with 1 hospital steward and 2 acting hospital stewards, sufficient for the needs of the hospital, though, when it is considered that this is also a supply depot, not too many.

At present there are but 2 surgeons at this hospital. It is due the acting assistant surgeons who have been connected with this hospital that they be mentioned in terms of highest praise. They have all done their work well.

The total number of cases treated in the hospital since it was opened is 1,706, with 18 deaths.

REPORT OF MAJ. J. D. GLENNAN, SURGEON, THIRTY-EIGHTH INFANTRY, UNITED STATES VOLUNTEERS, TO THE CHIEF SURGEON, DEPARTMENT OF SOUTHERN LUZON, DATED AT BATANGAS, MAY 12, 1900.

I have the honor to make the following report on the operations of the medical department of the Thirty-eighth Infantry, United States Volunteers:

The regiment arrived at Manila December 26, 1899, disembarked next day, and left Manila January 1, 1900, on the southern expedition through Bacoor, Imus, Perez, Dasmarinas, Silang, Tolisaye, Tanauan, and Lipa, arriving at Batangas January 16, 1900, where the headquarters of the regiment has since been stationed.

The regiment now garrisons four stations, Batangas, Lipa, San Jose, and Bauang, province of Batangas. During and shortly after the main expedition the regiment or parts of it had engagements and skirmishes at Tolisaye, Luta, Batangas, Taal, Gulibay, Talumpoc, Pao, Cuenca and other places. Small expeditions are constantly sent out from these stations covering the territory under the jurisdiction of the regimental commander.

Transportation, etc.—Eight Chino bearers were obtained at Bacoor for the hospital and an ambulance at Imus, but the ambulance and the small wagon train which came from Manila were abandoned at Dasmarinas, owing to the trails being impassable for wagons, and were not seen until after our arrival at Batangas. Carromatas and other carts were impressed at Tanauan and Lipa, and were used to carry sick, wounded, and supplies. The Chinos were used to carry litters and small boxes which had been prepared containing medicines, dressings, and materials for liquid foods, and were very useful as weight carriers, but are by no means as satisfactory as the Hospital Corps in moving sick and wounded. They also required constant watching to prevent their looting. In the present conditions and on short trips their services are no longer required. In the expeditions into the country about here not even carts can be taken. Ponies are used to carry men when necessary, but fortunately no serious case has occurred when wagon transportation was not available. The regular litters have been abandoned on these trips. They are too heavy to be carried all day over mountains. A much lighter litter can be improvised when necessary.

When it was decided that the Thirty-eighth Infantry should remain at Batangas, the other regiments comprising the expedition turned their sick and wounded over to the Thirty-eighth, but our wagon train arrived with supplies, a steamer came in with commissaries, and the hospital ship *Relief* took off a large number of the sick and wounded. The greatest assistance was rendered by the hospital ship in the way of supplies and removal of patients. At no time, either on the march or after arrival here, was there any want of necessary medical supplies or proper food for the sick.

Hospitals, diet, etc.—The present hospital at Batangas is in the municipal building, a large, cool, and pleasant building. Two other buildings across the street are also used, one as a detached ward for fever patients and one for quarters for the hospital corps men. Only the second stories are used as wards or quarters. There is also a small depot of medical supplies in the hospital. There are also hospitals in good buildings at the other posts of the regiment.

The sick are subsisted on the 40 cents per day fund. For liquid diets we have soups and condensed milks of different kinds, beef extracts, malted milk, evaporated cream, and recently Australian milk, which is proving very satisfactory. Eggs and chickens are very plentiful here. There has been some difficulty in obtaining fresh beef for the command.

Sanitation.—Water is boiled for drinking, and all waste matters from the command are removed from town and emptied into the river near the bay. The native method of disposal of waste on the surface of the ground is a constant menace to us, but our system of removal is being slowly extended to those living in the central part of the town.

Health, etc.—The health of the command is good and the number of sick and wounded has been surprisingly small, considering the kind of service. The sick report has been mainly from diarrhea, due to the saline water here; intermittent malarial fever, and sore feet from marching. This is a malarial region, and the country east of here is worse. There have been a few cases of dysentery, but not of the severer forms.

Two cases of smallpox occurred in the regiment, but the disease did not spread. These men have been repeatedly vaccinated, and at least one of them had been considered successful. I believe that much of the virus furnished in the United States is poor, and there is no certainty that the sore produced is a successful vaccination. I would recommend special care in the choice of lymph, and the hypodermatic method of vaccination. The regiment was revaccinated here with carabao virus from Manila, and many cases were successful which had before failed. Typhoid fever and smallpox are believed to prevail extensively among the natives here, due to the absence of all sanitary measures. We have been unable, so far, to vaccinate very many.

Three cases of typhoid fever occurred in the regiment, but the place of infection was discovered and no new case has occurred for a month.

The general condition and physique of the men have improved since enlistment. Young men have developed well; instances to the contrary are few, and the regiment is in good working condition.

The hospital stewards and hospital corps men on duty with the regiment have been equal to every emergency and have done much hard work, being on duty almost constantly. With increased experience their services have become more valuable, and the sick and wounded are intelligently, faithfully, and well cared for.

DEPARTMENT OF THE VISAYAS.

REPORT OF MAJ. L. W. CRAMPTON, SURGEON, UNITED STATES ARMY, CHIEF SURGEON DEPARTMENT OF THE VISAYAS, ILOILO, P. I., MAY 31, 1900.

I have the honor to submit the following report of the operations of the medical department for the period from January 1, 1900, to May 31, 1900. This department, originally the Visayan military district and First Separate Brigade, Eighth Army Corps, was organized into a department by General Orders, No. 1, Division of the Philippines, dated Manila, P. I., April 7, 1900, and is divided into four districts.

The first district embraces the islands of Samar and Leyte, the second the islands of Cebu and Bohol, the third the island of Negros, and the fourth the island of Panay. The headquarters of the department are at Iloilo. The department extends over a large extent of territory, and at the present time there are about 72 occupied stations, garrisoned by the following troops: Light Battery G, Sixth Artillery; the Sixth Infantry; headquarters and two battalions of the Eighteenth, and the Nineteenth Regiment of Infantry; the Twenty-sixth, Forty-third, and Forty-fourth regiments of Volunteer Infantry; the Negros organization of native scouts; and detachments of the Signal and Hospital Corps.

The number of medical officers and members of the Hospital Corps serving in the department at the present time is as follows: In the regular service, 1 major, 8 captains, and 2 first lieutenants. Four of the captains hold rank of major in the volunteer service.

In the Volunteers there are 1 major, 3 captains, and 3 first lieutenants. There are 41 acting assistant surgeons, 4 hospital stewards, United States Army; 9 hospital stewards, United States Volunteers; 20 acting hospital stewards, and 21 privates of the Hospital Corps. There are 8 female nurses on duty at the hospital in Iloilo.

At the present time there are twenty-five stations without medical officers, although not without medical attendance. It has been the aim to keep at least one private of the Hospital Corps with every detachment, however small, and an acting hospital steward whenever it was possible to do so. Occasionally a medical officer will have under his charge as many as four different stations, from 5 to 15 miles apart. In

visiting these substations not on the seacoast the officer has to travel on horseback, or by such conveyance as he may find, over roads almost impassable in the rainy season, and in some instances dangerous at all times, rendering it necessary for him to have an escort. Stations on the seacoast, while more easy of access, can not be visited with any regularity, for the reason that advantage must be taken of a passing steamer or sailing vessel going in that direction. This, of course, is not an ideal service for troops in the field, but with the limited number of medical officers serving in the department it is the best that can be done, and the results have been far better than might have been expected.

Care of the wounded on the field.—Prior to the issuing of General Orders, No. 10, Department of the Pacific, dated February 10, 1900, which prohibited the practice, Chinese laborers were largely used as litter bearers, one member of the Hospital Corps with two Chinamen constituting a litter squad. These, with such medical officers and acting stewards as might accompany the expedition, would operate on the firing line, administering first aid and removing the wounded to some convenient dressing station in the rear, from whence they could be transported by ambulance, bull cart, or such transportation as the country afforded, to the nearest permanent station. There is not much opportunity for varying the ordinary rules in caring for the wounded in engagements against an enemy such as we have. The transportation, as a rule, is very limited, and reliance must be placed almost entirely on the contents of the hospital corps pouches and the first-aid packets for the initial dressings, and as the number of wounded is usually small in comparison with the number engaged, these answer every purpose.

The first-aid packet, while a most valuable adjunct to a soldier's outfit, is by no means perfect in every particular. The great trouble in a tropical country, where the soldier is wet almost constantly from rain or perspiration, is to find a suitable and safe place to carry it where it will not only cease to be an incumbrance, but will not go to pieces from the moisture or become infected. The first-aid packet in its present shape can not be easily disposed of on the person of the soldier without giving him annoyance, especially when he lies down at night with his clothes on after a hard day's work. This could be remedied to some extent by changing its shape, but this would not prevent the tendency to destruction or the liability to infection. In my opinion the one place to carry the first-aid packet where it will be always at hand, safe from infection, and never an incumbrance, is the butt of the rifle, in a chamber made specially for the purpose, the same as is now provided for the ramrod. In place of the present shape the packet could be made into a cylinder, sealed up in tin or lead foil, and could be easily disposed of. The weight of the packet would nearly equal the weight of wood removed, if that should be urged as an objection, or the loss could be easily made up by increasing the weight of butt plate. The packet and the ramrod could be carried in the same compartment, but it is believed that it would be better to have a separate one for each.

Hospitals.—There have been no hospitals erected in this department, the buildings used for hospital purposes being either old government buildings, convents, or private dwellings. The hospital in Iloilo, the largest one in the department, occupies four private residences adjoining each other, in the central portion of the town, with a supplementary ward for venereal cases and convalescents in the palace.

These buildings are old and badly out of repair—the chronic condition of all Spanish buildings in this country—and would never have been used for hospital purposes if there had been any choice in the matter. The surroundings are unattractive, but paint and a plentiful use of soap and water have made a wonderful change in the interior. The building known as the palace is in very bad condition and is not susceptible of much improvement, and not much effort is expended on it except to keep it clean. The Iloilo hospital, under the charge of Maj. Herbert W. Cardwell, surgeon, United States Volunteers, is the largest one in the department, having a capacity of about 250 beds. Patients are received into this hospital from all stations in the fourth district, as well as from stations in the third district. The general policy has been to have a small hospital at all of the more important stations for the treatment of ordinary cases. Patients with typhoid fever and chronic bowel troubles requiring a special diet are usually sent to the Iloilo hospital. A hospital of 72 beds has been established at Cebu, in charge of Maj. H. C. Fisher, surgeon, United States Volunteers, the building being a part of an old convent and capable of considerable expansion. There is a small but well-equipped hospital at Bacolod, under charge of Capt. Paul Shillock, assistant surgeon, United States Army, with accommodations for about 40 patients. Another hospital of about the same capacity is located at Capiz, under the charge of First Lieut. E. A. Dean, assistant surgeon, United States Army. These hospitals are all well equipped and have ample accommodations for the care of all the sick in the department.

Barracks.—The buildings used for barracks are of the same general class as those used for hospitals, and are well adapted for the purpose in this climate. The subject of ventilation, air space, and overcrowding does not cut as much of a figure in the Tropics as in temperate climates, for the reason that the houses can be so thoroughly opened on all sides, thus giving free access to the wind, which fortunately blows almost continually.

Subsistence of the sick.—Until discontinued by General Orders, No. 11, Department of the Pacific, February 6, 1900, all the sick in this department except those treated in the hospital at Iloilo, where the 40 cents per day, as authorized by General Orders, No. 182, Adjutant-General's Office, 1899, was allowed, were subsisted on the 30 cents per day, Mexican, from the public civil fund. This was a very satisfactory way of feeding the sick, but unfortunately it was impossible, after repeated efforts, to induce medical officers, many of them new to the service, to comply with department orders regarding the expenditure, and for this reason it was disallowed. At the present time the sick at all hospitals where rations are utilized are subsisted as provided for in General Orders, No. 182. With the subsistence department and the produce of the country to draw from, medical officers have at their command a wide range of articles of special diet, and it is not believed that the sick of any army in the field are better cared for than our soldiers in the Philippines, where they have all the necessaries of life and many of the luxuries.

While the efficiency and the discipline of the Hospital Corps are open to criticism, it is perhaps better than ought to be expected under the circumstances. A hospital corps in time of war is a very different organization from the same corps under conditions of peace. Many of the men enlisted from civil life, without any military training whatever; they are transferred after serving less than a year in the line, and from the very nature of the service it is simply impossible to give them the proper instruction in their duties. Besides, many of the medical officers are new to the service, and while good men from a professional standpoint, they have not had the necessary training themselves to make them good instructors or disciplinarians. Yet there are enough good men to perform the duty of nursing efficiently, and I have never heard of one who failed in his duty in any way under fire.

Capt. T. S. Bratton, assistant surgeon, United States Army, regimental surgeon of the Nineteenth Infantry, has reported the case of a private of the Hospital Corps on duty in Cebu, which shows what a hospital corps man is capable of doing in an emergency. While Captain Bratton was absent from his station a native woman was badly cut with a bolo, one cut extending from the outer angle of the eye to the ear, allowing, it is said, the eyeball to drop out. She also had several bad cuts in the arm. Private Samuel Jones replaced the eyeball and sewed up the cuts, another private—Henry Becker, Hospital Corps—having administered the anæsthetic. The wounds in the arm were so severe that he advised amputation, possibly on account of the loss of the blood supply. This was refused. In a day or two the arm became grangrenous, and Private Jones again advised amputation, to which the woman consented. Private Becker administered the anæsthetic and Private Jones made a circular amputation above the elbow. At the time of Captain Bratton's report the stump was healed and the wound in the face nearly so. The efficiency of the Hospital Corps may be represented by a sliding scale, from Private Jones to the man who knows nothing, the preponderance being at Private Jones's end of the scale.

Sanitary condition of the command.—The health of the troops serving in this department has been uniformly good. Apart from the climate, the principal source of danger to our troops is the drinking water, and it is due to the rigorous enforcement of the order by medical and company officers, that all drinking water must be boiled, that typhoid fever, which, with dysentery, is the disease most to be feared by our troops, has not prevailed to a greater extent.

The total number of cases of typhoid fever treated in the hospital at Iloilo since November 1, 1899, the time the disease became prevalent—before that time there being but a few sporadic cases—is 54. During the same period there have been 6 cases at Capiz. At the present time there are 8 cases in the hospital at Iloilo and 1 at Capiz, all of whom are convalescing. This represents rather a small percentage when it is remembered that typhoid fever is endemic in these islands. The idea has become prevalent that typhoid fever was brought here by the Twenty-Sixth Infantry. This is both true and misleading. The Twenty-Sixty Infantry did arrive here with typhoid, but the disease was prevalent here among the natives long before, and has appeared in other regiments in other parts of the island. It is the common experience of medical officers that cases generally develop after a command has returned from a campaign in the field, when men will drink any kind of water.

Manson, in his work on tropical diseases, says: "It would also appear that soldiers on the march contract the disease in passing through an uninhabited country, in spite of the fact that the camp may be pitched in spots which presumably have never

been occupied by man before, and although the men may have drunk only of water from springs and streams that were beyond suspicion of fæcal contamination. Similar testimony comes from Australia, where typhoid has occurred in the back country hundreds of miles from fixed human habitation."

While typhoid fever may be controlled to a great extent by proper sanitary measures, it will never be entirely eliminated from any large body of troops on active field duty in a tropical country.

Smallpox prevails to an alarming extent in these islands, to the great terror of all newcomers, who in a short while pay no attention to it, and although our troops occupy towns and sleep in houses with impunity, the disease has not prevailed among them to any extent, the total number of cases so far being 20, with 5 deaths. This immunity is due of course to the repeated vaccinations to which the men have been subjected.

A vaccine farm has been established in Iloilo and has been in operation since April 1, from which virus is supplied to all parts of the islands, both for the vaccination of the troops and the natives. Instructions have been given to the chief surgeons of districts to use their utmost endeavors by cooperation with the native doctors to organize a system for the thorough vaccination of the natives. This has been done by our medical officers wherever virus could be sent them, and in some places, as in Iloilo, it has been made compulsory. This practice for the time can only be inaugurated in places now held by our troops. Reports have been received from several medical officers showing a marked decrease in the number of cases of smallpox among the natives. With a condition of peace throughout the islands and by the establishment of more vaccine farms, smallpox can in time be made to disappear, or at least cease to be an important factor in contributing to the sick list. It has been found that the virus obtained from the farm in Iloilo is much more effective than that obtained from Manila, for the reason that it is fresher, it being practicable to deliver it in most cases on ice.

When ice machines are placed at more points throughout the department, the question of vaccination of the natives will be very much simplified. The ice machine in Iloilo is the only one that has been in operation for any length of time. Another one has been placed at Cebu, and has been in operation since May 15.

The great source of danger to troops in the Tropics is the drinking water, and the men have learned to realize this, so that they readily take to the idea of drinking boiled water. Of course some men will drink anything, and when on the march drink what the country affords. In some places good springs can be found, but in the dry season water is obtained from shallow wells and small streams, both dangerous for drinking unless boiled. In the rainy season an abundant supply of rain water is collected in overground tanks. In Iloilo distilled water is furnished, but as the delivery of it is rather crude, being hauled in open tanks, some organizations, to avoid a possible contamination, take the further precaution of boiling it. A distilling plant has recently been put in at Cebu. The Waterhouse-Forbes water sterilizer should be furnished to all permanent stations. A few of them have been sent to the department and they operate in a most satisfactory manner.

Generally the health of the troops has been good, a great deal of the ineffectiveness being due to minor troubles, such as the dhobie itch and the small tropical ulcers, which are very annoying and difficult to heal. Dengue is also an important factor in building up a sick report. While typhoid fever stands in the front rank of the diseases to which our army is exposed, dysentery, with its concomitant liver abscess, is much more prevalent and claims many more victims. It is a common expression here that when a man gets dysentery his usefulness is about ended, especially if it becomes chronic, for these cases do not tend to recovery in this climate, and the sooner they are sent away the better.

Both beriberi and leprosy are quite prevalent in some of the islands, and although no attempt is made at segregation no case of either of the diseases has been reported among the troops in this department, and no case of bubonic plague has appeared among either troops or natives.

REPORT ON THE BRIGADE HOSPITAL AT ILOILO, PANAY, MADE TO THE CHIEF SURGEON DEPARTMENT OF THE VISAYAS, JUNE 1, 1900, BY MAJ. HERBERT W. CARDWELL, SURGEON, UNITED STATES VOLUNTEERS.

In compliance with your instructions to present a report of administration at this hospital for the period beginning June 1, 1899, and ending this date, I have the honor to report that I arrived at this station on September 25, 1899, and was assigned to duty in charge of the brigade hospital. This hospital had been organized by Maj. E. R. Morris immediately after the occupation of Iloilo by the American forces in

February, 1899, using for the purpose a private residence, which was one of the few buildings not destroyed by fire when the insurgents left the town. Some time afterwards an adjoining residence was also secured, as the number of patients increased, and on my arrival I found these two buildings in a fair state of repair, fairly well fitted with beds or cots, and sufficiently supplied with medical and surgical supplies for the care of the 50 to 60 patients that composed the normal number of inmates at that time. In October, 1899, when preparations were in progress for an advance upon the enemy, it was seen that hospital accommodations must be promptly and materially increased. Necessary supplies were readily obtained from Manila, and the second floor of a building adjoining those already in use was secured. These three buildings gave bed accommodations for about 190 patients, with sufficient room for dispensary, operating room, and executive offices.

After November 21, 1899, the troops formerly stationed at Iloilo, Jaro, and Molo were in the field, with the exception of a provost guard for the city, and there was in consequence no proper place for men who would ordinarily have been "sick in quarters." A further addition was then made to the capacity of the hospital by utilizing the upper floor of the "casa gobierno," or palace, at the farther end of the town, for a convalescent or supplementary ward. This building is still in use for the care of venereal cases and a few convalescents requiring only a minimum of attention.

The buildings are not suited for hospital purposes to this extent: More attendants are required for efficient work than would be required in a building arranged for the purpose. No building in this city or its neighborhood is suitable without the expenditure of a large sum for immediate repairs and alterations. The best of the buildings available is practically placed out of consideration, being situated in Jaro, distant from all of the ordinary water routes of transportation.

New buildings now in the course of construction in the city can, it is believed, be secured within the next two months at no greater cost to the Government than those now in use. If these are obtained the hospital will be very well housed.

No trouble has been experienced in securing from Manila all the medical and surgical supplies and appliances required for use, and improvements have been made steadily in substituting iron bedsteads for wood and canvas, and in providing better furniture for the operating and other rooms.

The hospital at present lacks many of the niceties of the magnificent institutions in great centers, but patients receive as good care here as in any civil hospital in which I have worked, and, in addition, with the aid of the allowance for commutation of rations, are much better and more suitably fed. There have been times when temporary deficiencies of the subsistence or quartermaster's departments have tried the souls of those in charge, but as a rule all wants have been promptly and properly met.

The administration of the hospital has not differed from that of any other institution of its kind. The entering patient is met by the clerk in charge of the register, who verifies the patient's name and record. He is then examined by the surgeon detailed for that purpose, Acting Assist. Surg. G. H. Calkins, to avoid possible mistakes in assignment to wards and to prevent the introduction of smallpox into the general wards. Check records furnished by the nurses and verified by the surgeons in each ward are used to trace and check the record of the patient, change in diagnosis or operations of note being recorded daily and immediately transcribed in the register. Clothing collected on admission is checked on a printed list in duplicate, verified by the patient, and one copy delivered to him, while the other copy is recorded and locked with the clothing in a numbered locker. Ordnance property is properly labeled and delivered to the ordnance officer of the department at his storeroom. Valuables are recorded, placed in individual boxes, and deposited in the office safe, which is itself within a vault.

The patient is sent to the ward with a duplicate diagnosis slip, one end of which is signed and filled in by the surgeon at his first visit, and the other end, attached to the ward chart, is signed and filled in on the return of the patient to duty. Comparison of these records prevents mistakes in the permanent record.

On return of the patient to duty two notices are sent out, one to the surgeon of the organization to which he belongs, and one to the commanding officer. If the organization is in Iloilo, the patient is sent direct to report to his commanding officer. If he requires transportation to his command, he is sent, with a printed notice of identification, to the adjutant-general for assignment to quarters and rations till transportation is available.

The medical staff of the hospital has shown little change, Acting Asst. Surgs. G. H. Calkins, R. M. Kirby-Smith, and Henry du R. Phelan having been on duty during the greater part of the period named. Each of these has from time to time done duty in the field in emergency, when expeditions were about to start and no

other medical officer was available. Their services have been in every respect above criticism. Dr. Phelan has but lately been relieved by First Lieut. E. W. Pinkham, assistant surgeon, United States Army.

In October, 1899, the Twenty-sixth Infantry, United States Volunteers, arrived at this station, and soon afterwards a case of typhoid fever was admitted from that regiment. This subject has been reported on in full before, but it is proper to say that the rapid scattering of this regiment (infected in the United States) through this island, and the quartering in towns, which in many cases they occupied only temporarily, with the rapid successive admission of case after case of typhoid from its ranks, gave rise to the gravest fear of a serious epidemic. Neither time, effort, nor money was spared to stamp it out, and although about 60 cases were treated in this hospital, no case has been admitted for over six weeks until within the last month, when 3 sporadic cases have been received. The total number of cases on hand now is 7 convalescent and 3 acute cases.

Smallpox is epidemic in the island, and since December, 1899, from 1 to 5 cases among soldiers have been in hospital, in tents set aside for that purpose and isolated. The Quartermaster's Department is now building a nipa smallpox hospital in the same inclosure of Government land with the vaccine farm (lately established here), and in an isolated spot. No cases of smallpox are now on hand, but it is feared that some will accrue with the new stations lately established.

Other diseases which have been treated here are of the same character as those encountered in other parts of the archipelago. Amœbic dysentery improves under quiet and strict dietary, only to relapse on return to duty and the ration. It is evident that return to a higher latitude is the only salvation of this class of cases. It is even doubtful whether a return to and a considerable sojourn in the United States would suffice, unless the case is sent early in its course. I have seen a soldier who was sent to the United States in the fall of 1898 and returned to duty here in 1900 immediately reenter the hospital with severe dysentery. This soldier had an excellent record, and there was no evidence whatever of any desire to shirk duty. Soldiers sent from here to Manila with a view to transfer to the United States frequently improve during the short trip to Manila and seem fit for duty, but almost without exception they have again to enter the hospital very shortly after their return here. Abscess of the liver as a result of dysentery has been seen in a number of cases, but in 2 cases of large mutiple abscesses of the liver no history of either dysentery or the liquor habit was obtainable.

In my opinion no case of true malaria has been treated in this hospital since my arrival. I am willing to admit that a diagnosis of "malarial fever" is a sign of weakness—an admission that no diagnosis has been made.

Bacteriological apparatus has but lately been received, and it is hoped to eliminate the word malaria from the sick report of the hospital.

REPORT ON THE POST HOSPITAL AT BACOLOD, NEGROS, MADE TO THE CHIEF SURGEON, DEPARTMENT OF THE VISAYAS, MAY 26, 1900, BY CAPT. PAUL SHILLOCK, ASSISTANT SURGEON, UNITED STATES ARMY.

The hospital at Bacolod, Negros, is situated in three buildings formerly used as dwellings, and for which a rental of $110 (Mexican) per month is paid by the Government. The buildings are ample for a hospital of this size, allowing 45 patients to be taken care of. They are in a fair condition of repair except the roofs, which leak. I have repeatedly called the attention of the proper authorities to the bad condition of the roofs, but owing to the owner refusing to make any repairs involving expense unless her rental be increased, the roofs have not been repaired. Under the directions of the district commander I have inspected buildings at Silay, offered for hospital purposes, but found them totally inadequate and unfit for such purposes. No other buildings in Bacolod large enough and appropriate for a hospital can be found except at an exorbitant rent. One building, the property of Señor Gonzaga, is large enough and in excellent condition for a hospital, but he asks $250 per month rent for it. A smaller building at Silay, the property of Señor De La Rama, is offered at $300 per month. Buildings for any purpose in Bacolod are very hard to procure and only at exorbitant rates, due to the influx of hacienda owners from the neighboring country into Bacolod to escape the disturbed condition of affairs in the country. The hospital has had such minor repairs as involved no expense, made to it by me, from time to time as necessary, and has at all times been kept scrupulously clean.

Bacolod until recently supplied all subposts on the island of Negros with their medical supplies. At present most of these subposts make direct requisitions on Iloilo. In an emergency subposts are still supplied from here.

Members of the Hospital Corps are sent from here to the subposts as required. A very large part of the time of medical officers and hospital corps men is taken up outside of their military duties in looking after the general sanitation of the pueblos.

REPORT ON THE POST HOSPITAL AT CEBU, ISLAND OF CEBU, MADE TO THE CHIEF SURGEON, DEPARTMENT OF THE VISAYAS, MAY 1, 1900, BY MAJ. HENRY C. FISHER, SURGEON, UNITED STATES VOLUNTEERS.

The hospital building is situated upon the Plaza de Legaspi, opposite the Cuartel del Infanteria. It is an old building, formerly occupied by the Recolleto monks as a "convent." Only a portion of the second story is used as a hospital, the chapel being used for its original purpose and the lower floor as quartermaster's and private storerooms. The building is old and in a poor state of repair, with leaky roofs. However, it answers the purpose as a temporary hospital fairly well, and the patients are comfortably cared for.

Hospital accommodation is provided here for the garrison of the post and for the severer type of cases from the smaller stations of this and adjacent islands. This hospital has also been serving as a subsupply depot for these places. At present there are 72 beds, but more have been asked for, so that 100 patients may be accommodated.

As a rule there have been sufficient supplies furnished, a notable exception being a deficiency in the supply of quinine last February and March, when there was a great increase in the prevalence of malarial fever.

Fresh milk is not obtainable, but malted milk and the various canned milks have proved very fair substitutes. It is hoped that soon the Australian canned milk may be obtained, as I have been asking for it since last January. Fresh eggs and other foods can be procured, and the hospital is able to set an excellent table upon the 40 cents allowed by the commissary.

The water supply is from shallow wells, and is boiled before being used. It is expected that soon the distilling apparatus now being erected will supply the hospital and the garrison with excellent water. An ice plant for the hospital is in course of erection.

The principal diseases have been malarial fevers, diseases of the skin, venereal diseases, dysentery, and diarrheal disorders. There have been few cases of typhoid fever.

At present I have as an assistant Acting Asst. Surg. J. F. Jones, United States Army. There are 1 hospital steward, 1 acting hospital steward, and 23 privates on duty with the hospital. Of this number there are usually several sick, and details have to be made for detached service.

REPORT ON THE POST HOSPITAL AT CAPIZ, PANAY, MADE BY LIEUT. IRVING W. RAND, ASSISTANT SURGEON, UNITED STATES ARMY, TO THE CHIEF SURGEON, DEPARTMENT OF THE VISAYAS, MAY 5, 1900.

Shortly after the entrance of the troops into this town the quartermaster provided for hospital use a building which is fairly well suited to its purpose—as much so as any in the place.

It faces the river, which is but a few feet distant. It is a two-story building, somewhat out of repair, but with no serious defect. The lower story is used for storerooms and the dispensary. It also has two rooms, dark, damp, and unsuited for use except as lumber rooms or workrooms for natives. In one of these two rooms wounded native prisoners are now confined. Attached to the lower story is the stable, in which are situated the earth closets for the corps and convalescents.

The upper story consists of two airy rooms, 27 by 20 feet, with narrow balcony overlooking the street. These are used as wards. Other smaller rooms are used as squad rooms, operating room, storeroom for patients' effects, lavatories, kitchen, pantries, etc.

A third of the house is guttered, converging to a small tank, 4 by 4 by 4 feet, in the courtyard. An additional tank has been requested. There is also in the yard a well, which has been cleaned, but its water has not been used. The water from a well at the convent has supplemented rain water when needed.

The working of the hospital has from time to time differed in relation to the force available for use there and also in relation to the supplies available.

When the campaign opened, at the commencement of dry weather, in November last, the transportation available for the medical department of each battalion was a portion of the battalion headquarters' bull cart, drawn by one bull. In these the indispensable medical and surgical supplies were taken, and the few forms and blanks

required. Everything else was stored in the quartermaster's storehouse in Jaro. At the close of the operations around Pavia and Santa Barbara expeditionary movements of from two to three days' duration were made into the country from the steamer *Elcano* until Capiz was reached, where Companies A and B, of the First Battalion, disembarked December 15, 1899, and Companies C and D went on to Romblon. The supplies now on hand consisted merely of what remained of the small stock taken with us on the campaign. Those stored at Jaro did not reach us until February 1, 1900.

On arriving at Capiz there were 2 acting stewards (1 sick with typhoid fever) and 5 privates.

Within the next three weeks 3 companies were detached, with a hospital corps man each, leaving 2 men and 2 acting stewards (1 still sick with typhoid). At this juncture 2 men were detailed from the companies for service with the corps, and the work of the hospital went on. At the time the companies were detached the surgeon requested that another medical officer and 6 hospital corps men be sent for duty in the district. An officer and 4 men were received, but the officer and 2 of the men had to be sent to Dao, leaving at Capiz 4 hospital corps men and the 2 men detailed from the companies.

Somewhat later the 2 detailed men were transferred to the corps and later assigned to duty here. At the present time there are for duty here 2 acting stewards, 1 cook, 1 day nurse, and 1 night nurse. Of the rest of the corps 1 is sick, 1 in the guardhouse, and 1 with Company L, Tenth Infantry, on detached service. This condition leaves the hospital chronically short-handed.

The senior acting steward attends sick call, notes treatment and disposition of cases, prepares morning and other reports, and exercises a general care over the hospital. The junior acting steward fills the prescriptions, dispenses medicine, and cares for the native sick prisoners. The cook attends to his specific duties and does inside police. The day nurse cares for his patients and polices the wards and hall. The night nurse's duties are limited as a rule to his night work. The rears are cleaned by the prisoners, and when necessary water is hauled by them. Prisoners are also painting the interior of the building. The hospital washing is done by a native of Capiz, and is paid for on vouchers by the medical department. The expenditure for ice for the hospital has as yet not been authorized, although urgently needed.

Of the six cases of typhoid which have been treated at this point by the surgeon, two cases, those of Acting Steward W. C. Moulton and Private Francis W. Philipps (report of December, 1899, diagnosed as malarial fever continued, but in January, 1900, was clearly typhoid) were contracted on the steamer *Elcano*, or during the campaign in the interior; that of Private Connelly was contracted while in General Hughes's column, crossing the island, and that of Privates Reed, Hansen, and Barnes, from Dumarao, or its neighborhood, as all three were sent in from there. None originated in Capiz. These cases have been of medium severity, with fever not ranging above 104°. Private Hansen, while in the third week of the disease, developed gangrenous stomatitis, or noma, and died ten days afterwards.

THE DIVISION OF CUBA.

HEALTH OF THE TROOPS.

In Cuba during the year 1899 the sick and death rates were in marked contrast to those of the previous year. In 1898 the troops were exposed to all the dangers of active service, to excessive fatigues, under exposure to tropical heat and heavy rainfalls, to sleeping without shelter and in wet clothes in the most malarious localities, and to the infection of yellow fever. In 1899 they were comfortably housed in barrack buildings constructed specially for them, or in Spanish barracks, which had been carefully disinfected and repaired for use. These barracks were on high and well-drained grounds, and some distance from neighboring towns, as a protection from infectious diseases. Attention was given to sewage disposal and the general police of the camps, to the supply of a pure water for potable and kitchen purposes, to the issue of a suitable ration, the careful preparation of the dietary, and the selection of appropriate clothing. Under these con-

ditions of garrison life it was to be expected that the mortality rate would be small compared with that of the previous year. There is no doubt, however, that if our troops in Cuba were to be called upon for active service they would again fall victims to the exposures incidental to such service in this island.

In Cuba during the year 1898, with a mean strength, volunteers and regulars, of 8,345, the admissions to sick report were equivalent to 3,413.54 per thousand men, and the death rate from all causes to 91.55 per thousand. Injuries contributed 265.43 to the rate of admission and 23.61 to the death rate, and gunshot injuries 163.68 and 21.69, respectively. Malarial infections constituted by far the largest proportion of the cases, 1,924.74 per thousand men, and contributed 14.02 to the death rate. But typhoid fever and yellow fever gave higher death rates: Six hundred and fifty-four cases of the former, with 154 deaths, gave 78.36 as the rate of admission and 18.45 as that of mortality; and 1,128 cases of the latter, with 139 deaths, gave the respective rates of 135.16 and 16.66. Diarrheal diseases contributed 335.05 to the rate of admission and 9.23 to the death rate. One case of smallpox, not fatal, was recorded.

In 1899, with a mean strength, regulars and volunteers, of 200.51 officers and men, the admission rate was 2,749.74, but the death rate was only 18.30 per thousand of strength. Injuries contributed 211.76 to the admission rate, but only 1.94 to the death rate, and gunshot injuries only 2.99 and 0.80 to these respective rates. Malarial fevers, as in the preceding year, contributed the largest proportion, 1,098.46, of the admission rate, but caused only 2.50 deaths per thousand men, as compared with 14.02. Seven hundred and ninety cases of typhoid fever, with 88 deaths, gave an admission rate of 39.40—only one-half of that of the preceding year—and a death rate of 4.39—only one-fourth of that of the preceding year—while 247 cases of yellow fever, with 48 deaths, gave the respective rates of 12.32 and 2.39 per thousand of strength, as compared with the much larger rates, 135.16 and 16.66, due to the exposures of the year 1898. Diarrheal diseases increased in recorded prevalence during this year to 434.35 per thousand of strength, but diminished in gravity, as shown by a reduction of the death rate from 9.23 to 1.45. One fatal case of smallpox was reported during the year.

SEASONAL PREVALENCE OF DISEASE.

In Cuba the mean monthly rate of admission to sick report from the army as a whole, regulars and volunteers, in 1899, was 211.41 per thousand of strength. During the early months of the year the rate was slightly below the mean; in May it dropped to a minimum of 116.24. In November and December it was also below the mean; but in July, August, September, and October it was above the mean, the maximum, 266.31, having occurred in August. Malarial fevers were chiefly responsible for the increased rates of these months.

The monthly death rate for the year was 1.36 per thousand of strength. It was above this from April to August, inclusive, the maximum having been 2.91 in July, due to 2.28 from yellow fever. The minimum was 0.54 in November. The following table illustrates the seasonal movement of certain diseases:

	January.				February.				March.			
	Cases.		Deaths.		Cases.		Deaths.		Cases.		Deaths.	
	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.
Typhoid fever	78	2.02	8	0.21	137	3.14	14	0.32	144	3.60	21	0.52
Yellow fever	4	.10	1	.03	3	.07			1	.02		
Malarial infections	3,801	98.65	8	.21	3,658	83.87	15	.34	3,816	95.29	6	.15
Undetermined fevers	60	1.56			80	1.83			168	4.20		
Rheumatic affections	220	5.71			274	6.28			243	6.07		
Consumption	21	.55	2	.05	14	.32	3	.07	11	.27		
All venereal diseases	382	9.91			436	10.00	1	.02	404	10.09		
Alcoholism and direct results	30	.78	1	.03	44	1.01	1	.02	71	1.77	2	.05
Diarrheal diseases	1,066	27.66	3	.08	1,658	38.02	3	.07	1,354	33.81	7	.17
Pneumonia	25	.65	6	.16	23	.53	5	.11	5	.12	1	.02
Total respiratory	393	10.20	6	.16	422	9.68	6	.14	341	8.52	1	.02
All diseases	7,933	205.89	44	1.14	8,676	198.93	53	1.22	8,302	207.31	45	1.12

	April.				May.				June.			
	Cases.		Deaths.		Cases.		Deaths.		Cases.		Deaths.	
	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.
Typhoid fever	153	7.26	14	0.66	75	5.45	10	0.73	46	3.56	4	0.31
Yellow fever					3	.22			80	6.19	13	1.01
Malarial infections	1,787	84.81	5	.24	964	70.08	3	.22	1,075	83.22	2	.15
Undetermined fevers	41	1.95			26	1.89			19	1.47		
Rheumatic affections	108	5.13			70	5.09			71	5.49		
Consumption	5	.24	1	.05	8	.58	1	.07	2	.15		
All venereal diseases	225	10.68			216	15.70			191	14.79		
Alcoholism and direct results	55	2.61			32	2.33			34	2.63		
Diarrheal diseases	782	37.11	2	.10	736	53.50	8	.58	682	52.79	1	.08
Pneumonia	10	.47	3	.14	7	.51	3	.22	1	.08		
Total respiratory	169	8.02	3	.14	106	7.71	3	.22	46	3.56		
All diseases	4,085	193.88	30	1.42	3,005	116.24	31	2.25	2,914	225.59	27	2.09

	July.				August.				September.			
	Cases.		Deaths.		Cases.		Deaths.		Cases.		Deaths.	
	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.
Typhoid fever	46	3.61	2	0.16	40	3.19	4	0.32	27	2.21	2	0.16
Yellow fever	100	7.86	29	2.28	31	2.48	1	.08	17	1.39	4	.33
Malarial infections	1,239	97.31	2	.16	1,395	111.40	3	.24	1,217	99.44	2	.16
Undetermined fevers	30	2.36			52	4.15			76	6.21		
Rheumatic affections	65	5.11			78	6.23			58	4.74		
Consumption	7	.55			10	.80			3	.25		
All venereal diseases	201	15.80			191	15.25			191	15.61		
Alcoholism and direct results	62	4.87	1	.08	56	4.47	3	.24	23	1.88		
Diarrheal diseases	607	47.68			587	46.87	1	.08	383	31.29	1	.08
Pneumonia	4	.31					1	.08	2	.16		
Total respiratory	60	4.71			79	6.31	1	.08	45	3.68		
All diseases	3,158	248.04	37	2.91	3,335	266.31	18	1.44	2,627	214.64	15	1.23

	October.				November.				December.			
	Cases.		Deaths.		Cases.		Deaths.		Cases.		Deaths.	
	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.
Typhoid fever	14	1.26	2	0.18	14	1.26	2	0.18	16	1.46	2	0.18
Yellow fever	4	.36	2	.18	2	.18			2	.18	1	.09
Malarial infections	1,357	121.69	3	.27	1,049	94.49			667	61.00	1	.09
Undetermined fevers	195	17.49			71	6.40			19	1.74		
Rheumatic affections	79	7.08			58	5.22			45	4.12		
Consumption	3	.27							6	.55	1	.09
All venereal diseases	190	17.04			160	14.41			198	18.10		
Alcoholism and direct results	45	4.04			50	4.50	1	.09	26	2.38		
Diarrheal diseases	350	31.39	1	.09	279	25.13	1	.09	225	20.58	1	.09
Pneumonia					1	.09	1	.09	1	.09		
Total respiratory	50	4.50	1	.09	57	5.13	1	.09	53	4.85	1	.09
All diseases	2,887	258.91	10	.90	2,243	202.04	6	.54	1,724	157.68	12	1.10

YELLOW FEVER.

There is now no general military hospital in the Division of Cuba, but there are several post hospitals which by their capacity, accommodations, and the efficiency of their staffs are able to receive and care for all cases requiring special treatment.

Each of the posts has a well-equipped hospital provided with isolation wards for yellow fever and detention wards for all fevers of a suspicious character, until their nature has been satisfactorily determined. Thus each post is prepared to take care of its own yellow-fever patients. Each command is also prepared to move out of its quarters to selected grounds in case of the appearance of yellow-fever infection in its barracks.

During the fiscal year ended June 30, 1900, six outbreaks of yellow fever occurred involving our troops. The disease appeared first at Santiago, beginning in June, 1899, and continuing until October 15; 12 officers and 129 enlisted men became affected, of whom 5 officers and 26 enlisted men died. The report of this outbreak by Maj. L. C. Carr, surgeon, United States Volunteers, was submitted in my last annual report, page 251. The failure of the troops to move promptly from their infected quarters was the cause of this large death record in this garrison. Cases which occurred in July and August, 1899, in Puerto Principe and Cabana Fortress, Havana, also are recorded in my last annual report, page 261.

On March 5, 1900, the chief surgeon of the Department of Santiago and Puerto Principe caused the following circular to be issued for the guidance of the medical officers in his department:

CIRCULAR No. 2. HDQRS. DEPARTMENT OF SANTIAGO AND PUERTO PRINCIPE, *Santiago, Cuba, March 5, 1900.*

[Prepared by the chief surgeon.]

In order to guard against the introduction and spread of yellow fever in this department, commanding officers, besides the provisions of Circular No. 22, of December 21, 1899, will, on April 1, 1900, or as soon thereafter as practicable, carry out the following special instructions. For this purpose they will direct their medical officers to seek the cooperation of the officers of the Marine-Hospital Service, and avail themselves of such hospital accommodations or disinfecting plants as may be offered by said service:

First. In all garrison towns and their seaports a census will be made of all non-immune persons, so that the extent of susceptibility to infection may be known and adequate preparations made. Such census will naturally include all persons, not native, who have never had the disease.

Second. In seaboard towns especially, homeless and destitute nonimmunes (mostly loafers and tramps) are the most dangerous element of the population, and will, so far as practicable, be removed to the country, isolated, or placed in confinement under medical supervision.

Third. If a suitable building is not available, a sufficient number of tents will be pitched in an isolated spot and made ready for the admission and treatment of yellow-fever cases. Near this hospital, but not connected with it, should be another set of tents (detention camp) for the reception of all suspicious cases or cases coming from an infected locality.

The tentage will be furnished by the Quartermaster's Department, and the furniture, supplies, and medicines by the Medical Department.

Fourth. The necessary personnel will be selected and in readiness. In the absence of an army medical officer the commanding officer will make an agreement with the best civilian physician available, who will be prepared to take charge of the yellow-fever hospital on the day the first case breaks out, his compensation to begin from that day in accordance with contract to be made with him by the chief surgeon.

One immune attendant will be engaged and placed in charge as soon as the hospital

is ready, at $30 per month and a ration, his pay to begin at once. If cases of yellow fever occur the chief surgeon will authorize as many nurses and attendants as may be necessary.

Fifth. Upon completion of the preparations prescribed in the above paragraphs, a report describing the names of persons selected or engaged and other action taken in carrying out the provisions of this circular will be forwarded to these headquarters.

Sixth. Civilians under treatment will be charged $1 a day, or only 50 cents if employees of the Government. If unable to pay, bills in duplicate may be sent to the chief surgeon for settlement.

Ice for the sick and lime for disinfection can be purchased by medical officers as already provided by the chief surgeon.

Seventh. All buildings known to have been infected in previous years will be carefully inspected, and, if deemed necessary, subjected to a fresh disinfection.

Eighth. Where no steam plant is available, disinfection of bedding and clothing may be effected by a small portable formaldehyde generator, or by thorough boiling in a mild sublimate solution, followed by complete exposure to sunshine. A hand pump, to throw a stream of sublimate solution against walls, floors, ceilings, etc., is always very useful, and will be supplied on application to the chief surgeon.

Ninth. All persons coming from infected localities will be kept isolated for five days at the detention camp and disinfected before being discharged.

Tenth. Cases of fever in nonimmunes should be carefully watched, and as soon as they become suspicious promptly removed to the detention camp.

All physicians will be ordered to report within twenty-four hours any suspicious cases under their care to the medical officer in charge.

All cases of yellow fever will be promptly wired to the chief surgeon.

Eleventh. According to general experience, the three most important symptoms upon which a diagnosis of yellow fever may be based in the first stage are:

(1) Injection and glistening of conjunctivæ, together with general congestion of the skin.

(2) Steadiness or falling of pulse, with rising temperature.

(3) Albumen in urine.

In order to appreciate properly the indications of pulse and temperature, they should be recorded not less than three times a day upon the usual chart. Such a chart should by itself by the end of the first week clear all doubts as to the nature of the fever.

By order of Colonel Whitside:

J. G. HARBORD,
First Lieutenant, Tenth U. S. Cavalry, A. A. D. C., A. A. A. G.

REGISTRATION OF NONIMMUNES.

Later, on July 3, 1900, on the recommendation of Maj. F. J. Ives, surgeon, United States Volunteers, chief surgeon of the Department of Matanzas and Santa Clara, the following circular concerning the registration of nonimmunes was published as a precautionary measure against the spread of yellow fever:

1. The mayors of the following cities, Matanzas, Cardenas, Colon, Cienfuegos, Santa Clara, Trinidad, Sancti Spiritus, Sagua la Grande, Caibarien, Placetas, and Remedios, should be required at once to prepare a list of all nonimmunes, exclusive of the officers and soldiers of the United States Army, but including the families of the above, and all civilian employees. In order to obtain this list a proclamation should be issued by the mayor requiring every nonimmune to be registered, stating in each case the full name and address, and whether an adult or child, all persons over 16 years being considered adults. In this proclamation the necessary measures for securing this information should be embodied. It should be clearly stated that any adult failing to comply and be registered at the end of ten days after the date of the order, would be fined at least $1 for every day that he or she remains unregistered, and the parent or guardian of any child will be fined an equal amount for all children not registered, in the same manner and amount as above.

The term immune should be construed to mean all natives of the island of Cuba, all foreigners who can establish a residence of at least ten years on the island, and all others who can produce a certificate from a reliable physician that they have had yellow fever. The term nonimmune signifies any person who is not immune as above described.

The proclamation should be written in both Spanish and English and conspicuously posted on the bulletin boards in front of each alcaldia. In addition it should also be advertised in the local papers.

2. Should yellow fever appear in any of the towns of this department to an extent sufficient to create apprehension of its being exported, the chief sanitary officer of the department will notify the mayor of the infected town to permit no nonimmune to leave the town without previously notifying the mayor, in writing, of the date of such departure and the destination. The mayor, upon being thus notified, will at once notify by telegraph the mayor of the town to which the nonimmune is going. The latter mayor will, upon the arrival of the nonimmune, ascertain his address and cause his chief sanitary officer, or one of the municipal physicians, to investigate the case and keep the case under observation until the period of infection has passed. Should the nonimmune be an officer or a soldier, or a member of the family of an officer or soldier, the commanding officer of the garrison from which he leaves should be required to notify the commanding officer of the garrison in the town where the nonimmune is going, and the military surgeons be required to take the necessary precautions. Should a nonimmune of the latter class be going to a town where there is no garrison, the commanding officer will notify the mayor of such town, who will take the same measures as in the case of those not connected with the military establishment. Should any nonimmune arrive from an infected town at any of the seaport towns, the quarantine officers of the port should be at once notified of that fact by the local municipal authorities, or by the military authorities in case of an officer or soldier or a member of the family of an officer or soldier.

There should likewise be a punishment for all nonimmunes failing to give the proper notifications to the municipal authorities, consisting of appropriate fines, or imprisonment, or both.

Notwithstanding the precautions taken an outbreak occurred at Santa Clara on May 10, 1900, which continued until the garrison moved into camp. Thirty-six officers and men became affected, of whom 10 died.

On May 19, 1900, an outbreak took place at Quemados, the headquarters of the Department of Havana and Pinar del Rio. Eleven officers and men were taken sick and two died. The infection did not reach the large post of Columbia Barracks, only half a mile distant. The chief surgeon of the department recommended as a measure for the suppression of the epidemic the removal of the nonimmunes of the village of Quemados into a camp about 2 miles distant; there were about 140 nonimmunes, of whom 84 were white Americans. This officer, Maj. Jefferson R. Kean, became affected with the disease, but his plans for its suppression were ably perfected and carried out by Capt. A. N. Stark, post surgeon, Columbia Barracks. After the removal of the nonimmunes, saloons, houses of prostitution, and all resorts where one could contract the disease were closed. A rural guard was placed on duty to arrest all soldiers or civilian employees found in the town. It was the intention to keep the nonimmunes in camp until November 15, the saloons and other resorts to be closed indefinitely.

On February 20, 1900, Capt. W. W. Quinton, assistant surgeon, United States Army, post surgeon at Guanajay Barracks, reported a case of yellow fever in the person of a soldier of the First United States Infantry, who was taken sick January 4, 1900, had black vomit on the 9th, and died next day. Post-mortem examination showed that there was no doubt of the character of the case. Every precaution was taken to prevent the spread of the disease and no other case occurred at that time.

Nothing more was heard of yellow fever at this post until July 4, 1900, when another soldier of the First United States Infantry became sick with fever, which, two days later, was recognized as yellow fever.

The patient was transferred to the civil hospital in Guanajay, where death occurred July 9. The disease was believed to have been contracted in the city. On July 20, 2 cases; on the 21st, 3 cases; on the 28th, 2 cases, and on August 7, 3 cases were reported, only 1 of which proved fatal. Meanwhile measures had been taken to prevent the spread of the disease. The barracks and hospital were cleared of all occupancy and disinfected with bichloride solution, the men meanwhile occupying tents at some distance from the infected buildings, and on August 24 Acting Asst. Surg. J. F. Dunshie, post surgeon, reported that no case had occurred in the command since August 7.

Lastly, at Pinar del Rio Barracks a sergeant of the First Infantry was taken sick May 10 and died on the 16th with what was recorded as pernicious malarial fever. Another case was reported June 14, and 4 others were taken on sick report during the remainder of the month. Only 1 of these 5 cases recovered. Twenty-seven men, 4 of whom were civilians, became affected in July; 8 of these died. The epidemic was suppressed by the removal of the troops into camp about 3 miles from the barracks. Only 2 cases occurred in the command after the infected barracks were abandoned. This move should have been made much earlier.

MUNICIPAL SANITATION.

During the year the medical officers serving in the Division of Cuba attended not only to their proper military work at their respective posts, but most of them discharged duties of a responsible character in connection with the sanitation of cities and towns. In Havana the work of sanitation has been carried on with much vigor, especially as regards the cleaning of streets, privies, and the interior of houses; but, according to Chief Surgeon Havard, the best results can not be expected until a new system of sewerage has been laid.

The following table, compiled by Maj. W. C. Gorgas, surgeon, United States Army, chief sanitary officer of the city of Havana, shows the mortality from yellow fever for citizens and soldiers, by months, from January, 1890, to May 31, 1900. From it may be seen the great mortality among the nonimmune Spanish soldiers sent from the Peninsula in 1896 and 1897 to suppress the Cuban insurrection. In 1896 there were 1,153 deaths of soldiers and only 135 of civilians; in 1897, 813 of soldiers and only 45 of civilians; in 1898, 111 soldiers and only 25 civilians died, the conditions during this year preventing the ingress of persons susceptible to the disease. The civilian deaths during these years were few as compared with the losses suffered by the Spanish troops. But in 1899, during the occupation of the city by United States troops, this relative mortality was reversed; 92 civilians died of yellow fever and only 11 soldiers, although up to the time the volunteers left there were over 20,000 troops in and about the city. This is creditable to the care taken by our medical officers.

The great fatality of yellow fever among the Spanish troops was the result of apathy, or a want of knowledge on the part of their medical officers of methods of prophylaxis. Their garrisons appear to have been left to suffer until the disease had spent itself by affecting all who were susceptible to its influence. The method of moving the troops from the infected locality, so successfully carried out by our medical officers under instructions from this office, does not seem to have been practiced by the Spanish authorities.

Deaths from yellow fever in the city of Havana.

Months.	1890.		1891.		1892.		1893.		1894.		1895.	
	Military.	Civilians.	Military.	Civilians.	Military.	Civilians.	Military.	Civilians.	Military.	Civilians.	Military.	Civilians.
January	2	8	6	4	9	6	1	14	3	4	4	11
February	2	2	0	3	4	6	0	6	4	0	1	3
March	3	1	3	1	1	0	2	2	2	0	1	1
April	7	6	1	4	3	5	6	2	1	3	1	5
May	14	9	3	4	1	6	19	4	16	0	0	10
June	28	10	28	13	3	10	17	52	27	4	1	15
July	36	31	56	10	9	18	40	78	65	12	7	81
August	33	27	44	22	20	47	19	81	47	26	34	86
September	13	20	39	26	16	54	11	57	33	43	42	93
October	9	23	23	25	20	34	10	36	9	31	39	63
November	6	9	10	14	13	39	3	25	3	20	13	22
December	3	6	7	10	5	28	3	8	6	23	15	5
Total	156	152	220	136	104	253	131	365	216	166	158	395
Grand total	308		356		357		496		382		553	

Months.	1896.		1897.		1898.		1899.		1900.	
	Military.	Civilians.	Military.	Civilians.	Military.	Civilians.	Military.	Civilians.	Military.	Civilians.
January	6	4	69	0	4	3	0	1	0	8
February	7	0	24	0	1	0	0	0	0	9
March	3	0	29	1	2	0	0	1	0	4
April	12	2	70	1	1	0	0	2	0	0
May	26	7	85	3	4	0	0	0	0	2
June	42	4	171	3	2	1	1	0	.....	.....
July	103	13	162	6	14	2	0	2	.....	.....
August	229	33	95	7	13	3	4	9	.....	.....
September	142	24	48	8	29	5	5	13	.....	.....
October	211	29	33	9	24	2	1	24	.....	.....
November	230	14	22	4	8	5	0	18	.....	.....
December	142	5	5	3	9	4	0	22	.....	.....
Total	1,153	135	813	45	111	25	11	92	.....	.....
Grand total	1,288		858		136		103		.....	

REPORT OF MAJ. VALERY HAVARD, SURGEON, UNITED STATES ARMY, CHIEF SURGEON DIVISION OF CUBA, DATED AT HAVANA, CUBA, JULY 10, 1900.

I have the honor to submit the following report for the year ending June 30, 1900:

I was relieved from duty as chief surgeon, Department of Santiago and Puerto Principe, and directed to proceed to Havana and report to the commanding general Division of Cuba, for duty as chief surgeon of that division, by Special Orders No. 77, Adjutant-General's Office, April 2, 1900. I arrived at Havana and reported as ordered on April 23, 1900.

My predecessors in this office were Lieut. Col. R. M. O'Reilly, from January, 1899, to November, 1899, and Lieut. Col. Calvin De Witt, from January, 1900, to April, 1900.

At the time I took charge the general military hospitals, which after extensive and expensive repairs had been occupied by our numerous sick during the first year of the intervention, had become unnecessary and had already been turned over to the civil authorities. Although there is now no general hospital in the division, the departments have one or more post hospitals, which by their capacity, accommodations, and the efficiency of their staff are able to receive cases requiring special treatment.

During the year medical officers not only attended to their proper military work at their respective posts, but the great majority of them discharged other duties, often of an arduous nature, in connection with the sanitation of cities and towns and the management of civil hospitals. The department chief surgeons especially have been obliged to give these civil matters a large portion of their time and often the

closest attention. Sanitation is such a modern science and has been so utterly neglected in Cuba that the progress of the education of the native profession and laity in that direction is necessarily slow, but not discouraging, and the results of this education will not be one of the least benefits of the intervention.

Yellow fever.—In view of the approaching yellow-fever season, one of my first cares was to verify the precautions taken and preparations made to avoid the contagion, and if cases occurred to isolate and treat them. These matters have been carefully attended to by the department chief surgeons. Each post is required to have a detention ward (where all cases of fever are admitted and kept until their nature is determined) and isolation wards.

Our largest posts consist of new frame structures, erected on high grounds, at some distance from neighboring towns, and therefore affording not only every hygienic advantage but also entirely free from the contagion of yellow fever and easily kept so.

A few of the old Spanish barracks are still occupied—as, for instance, at Pinar del Rio, Matanzas, Cardenas, etc. These barracks are not only dangerous in themselves, but being in towns they easily become infected or reinfected, as was shown at Santa Clara.

Each important post is prepared to take care of its own yellow-fever patients. As there is no garrison in the city of Havana, the rare cases which might occur at the Pirotecnia or at posts No. 4 or 5 can safely be taken care of at the regimental hospital of the Second Artillery, or at Las Animas hospital, while those which may occur on the east side of the bay will be admitted at the Cabana field hospital.

For all Americans, Government employees or others, who may contract the disease a ward has been fitted out at Las Animas hospital, where they are attended by English-speaking physicians and American trained nurses.

Spaniards who have immigrated during the past year, who now furnish and will continue to furnish the great majority of yellow-fever cases in Havana, are taken to the hospitals of the several mutual beneficial associations to which they belong. These hospitals are in the suburbs of the city and provided with contagious-disease wards more or less isolated. It would be a much more satisfactory plan to send all cases to Las Animas hospital, which is especially intended for yellow fever, but such a plan could not be carried out without doing violence to the habits and feelings of the patients and their friends, and it seems best at present to insist on the strict isolation and disinfection of the wards where such patients are received.

During the fiscal year ending June 30, 1900, there have been three outbreaks of yellow fever in Cuba, all involving our troops, more or less.

The first was at Santiago de Cuba, beginning in June, 1899, and continuing through the summer, or until no susceptible material remained within reach; 138 officers and enlisted men were taken sick and 30 died.

The second was at Santa Clara, beginning on May 10, 1900, and continuing through June, or until the garrison had been moved into camp and thoroughly disinfected: 36 officers and enlisted men were taken sick and 10 died. In this outbreak only soldiers and quartermaster's employees suffered, the exemption of citizens showing how completely they were immunized by the virulent epidemic which decimated the town in 1898. The outbreak originated in one or two houses close to the barracks, where several patients had died in 1898. Nonimmunes had occupied these houses in 1899 with impunity.

The third was at Quemados, the headquarters of the Department of Havana and Pinar del Rio, beginning on May 19, 1900, and continuing in June until all nonimmunes had been driven out of town; 11 officers and enlisted men were taken sick and 2 died. It has been attempted to connect this outbreak with that of Santa Clara, but as the two persons (man and wife) who form the connecting link came from that town to Quemados on April 1, and did not develop the disease until May 19, the demonstration is far from complete. It is also almost certain that a case of yellow fever died at Quemados last March, on General Lee street, thus showing previous infection.

The presence of a garrison of 2,000 or more men within a mile of Quemados was naturally a subject of great anxiety, but thanks to the very energetic measures recommended by Maj. J. R. Kean, chief surgeon, and (after he was taken sick) by his able successor, Capt. A. N. Stark, the contagion did not reach any portion of the post.

Our increased experience with yellow fever has shown us there is much about the nature, development, and communicability of the contagium of which we are ignorant. The laws governing this disease have not yet been discovered. It continues to strike when and where it listeth, regardless of our most reasonable expectations and best hygienic measures. Why the germ should remain quiescent and inactive one or two seasons in the presence of susceptible material and then suddenly become active

and virulent, is a question still unanswered. The outbreak at Santiago last year was attributed, on what appeared good grounds, to the intensely hot and dry spring, while the outbreaks of this year at Santa Clara and Quemados are attributed, on equally good grounds, to the unusually heavy rains which fell in April and May. One thing appears to have been pretty well demonstrated and forms a valuable rule for our guidance; namely, that troops in uninfected buildings a few miles from yellow-fever foci can be saved from infection by simple but very strict precautions.

Health of troops in Cuba.—The eastern, middle, and western sections of Cuba offer no peculiarities of climate producing marked effects upon the health of troops. Thus, the total admissions per 1,000 of mean strength are 3,311 for the middle department, 3,299 for the eastern, and 3,066 for the western. The percentage of deaths is greatest in the eastern department and least in the western; this is accounted for by the sharp outbreak of yellow fever in Santiago in the summer of 1899. Malarial fever is everywhere, but most prevalent in the eastern region, diminishing westward, the proportions being 1,423 admissions per 1,000 of mean strength in Santiago and Puerto Principe, 1,126 in Matanzas and Santa Clara, and 576 in Havana and Pinar del Rio. Yellow fever has occurred in the three departments and is just as liable to break out in one as the other, no part of the island enjoying immunity against it.

The total number of deaths among the troops in Cuba during the year was 146, or 15.16 per thousand. In the United States Army during the decade preceding the Spanish-American war it was 6.99 and during the calendar year 1898 (from all causes) 27.55. This mortality of 15.16 per 1,000 is not high if we consider the number of admissions, and shows that of the diseases which incapacitate so many of our men few are dangerous to life. Of these the most dreaded is yellow fever, but the measures taken will almost certainly prevent its occurrence in the future among enlisted men, except as rare sporadic cases, producing but little effect upon the total mortality.

The admissions for typhoid fever per 1,000 of mean strength are 13.73, and the mortality 1.87, while in the United States Army during the calendar year 1898 the rate of admissions was 88.56 and the mortality 9.74. Typhoid fever is very rare among the natives of Cuba. When it attacks our troops it is almost always by imported infection. It should therefore be possible to completely eliminate this disease from the island.

Not a single case of smallpox occurred during the year, and only two of measles.

The total admissions for diarrhea and dysentery per 1,000 of mean strength is 317, and the mortality only 0.73. In the United States during the decade preceding the Spanish-American war the admissions were 107 and the mortality 0.10, but during the calendar year 1898 these figures rose to 304 admissions and 2.14 deaths. Our figures for Cuba show by comparison a very large number of cases with a very low mortality.

The number of cases of venereal diseases throughout this division is very high. I regret to have no figures to show its accurate extent, but it forms by far the largest item of the column of "All other diseases." It is the burden of complaint of most post surgeons that about one-half of their patients are of this class. Of the various measures suggested and applied to mitigate this serious and widespread evil, none appears to have had the decided success which followed that of Maj. F. J. Ives, chief surgeon of Matanzas and Santa Clara, and which will be fully reported on by himself. It consists in subjecting all enlisted men to weekly examination, treating those who show signs of disease and depriving them while under treatment of the pass and canteen privileges; thus not only are all cases early submitted to proper treatment, but prevented from becoming aggravated by fresh exposure or the use of stimulants. This system, at first opposed by officers, has given such excellent results that it now meets with nothing but commendation at the posts where it is in operation.

Hygiene of posts.—The examination of the monthly sanitary reports from the posts reveals nothing of much importance. No sanitary defect has been complained of that was not remedied so far as possible. The disposal of garbage and excreta is everywhere receiving particular attention; where sewers are not available, the dry earth and lime system, or milk of lime system with excavator, are used with entire satisfaction. The clothing appears very satisfactory. I believe the campaign hat would be very much improved by an all-round ventilator, as in the helmet. Of the food I can only say that it is what the captain of the company, his first sergeant, and cook choose to make it; the needful materials are amply provided by the ration. It is true that green fresh vegetables are scant and expensive in the markets, but at permanent posts they can be produced abundantly. Man eats less in the Tropics; less fuel is required to keep up animal heat, especially when but little physical energy is expended; but of this reduced quantity of food it is questionable, judging from rather extensive practical observation, whether the relative proportion of meat is less or should be less than in the United States. Of the native fruits all are perfectly

wholesome if mature and not overripe, and I have not yet seen any ill effects from eating them, even in large quantity. The soldier coming from the United States does not realize the importance of accommodating his habits to the requirements of a tropical climate by cultivating temperance in eating and drinking, and in this way avoiding the many diarrheal and other troubles from which he suffers. It would be greatly to his advantage were he to imitate the admirable sobriety of the Cubans.

Havana.—The work of sanitation in the city of Havana has been carried on with much vigor during the year, especially as regards the cleaning of the streets, privies, and interior of houses; but such work is necessarily imperfect and can not give the best results until a new complete system of sewerage has been laid. Enough has been done, however, to have a decided effect upon public health, especially during the past three months, as shown by the lowering of the death rate to 24 per thousand for the month of May, the last for which the rate has been computed. Maj. W. C. Gorgas, surgeon, United States Army, chief sanitary officer, deserves special commendation for his untiring efforts in the discharge of his manifold duties.

From a very interesting (as yet unpublished) "Note on mortuary record of yellow fever in Havana, 1884–1900," generously placed at my disposal by the author, the well-known yellow-fever expert, Surg. H. R. Carter, of the Marine-Hospital Service, I quote the following extracts:

"The belief that seems prevalent among Americans that it is safe to come to Havana in November and perfectly safe in December, but that they must leave with the early summer, is absolutely without basis. May will average safer than January. In not a few years June is safer than December, and it is fair to class from June to December, inclusive, as a period of danger, and from January to May, inclusive, as comparatively safe, January being the most dangerous month of this division of the year.

* * * * * * *

"What, however, most impressed the writer when he compiled these figures was the small number of deaths among the civilian population, 210.4 per annum being the average for the ten normal years preceding 1895 and 195 per annum for the last seventeen years. We must note, too, that these figures for civilian deaths are somewhat too high, including, as they do, a few soldiers.

"During this time, then, seventeen years, there has never been any death rate among the civilian population even approaching to the epidemics of our own country—compare with 7,800 deaths in New Orleans in 1853. Yellow fever for seventeen years has not been a marked factor in the civil mortality per annum in Havana.

* * * * * * *

"The books in my office show that civilian immigration nearly ceased after 1895 and that it was not resumed until in August, 1899. This is doubtless the reason why 1896, 1897, and 1898 were years of small civilian mortality, while 1896 and 1897 pile up the highest military mortality ever known here: 1896, civil 141, military 1,579; 1897, civil 61, military 1,083.

"In 1898 the bulk of susceptibility among the soldiers must have been exhausted, as a garrison of 29,000 to 30,000 gave only 333 deaths. The same is true of civilians, for whom we record only 31, the lowest number in the history of Havana which we have recorded. Among the deaths in November and December are those of a small number (5, I believe) of Americans who had come to Havana, believing these months to be free from danger.

* * * * * * *

"Up to the end of August the civilian mortality for this year (1899) was extremely small, and for August and September was decidedly less than the normal before the war, although greater than for the two preceding years. Instead of reaching its maximum, however, in August and September, the October mortality nearly doubled its September figure and December's was only 2 less. It suffered a marked change in January, but extended into March, and reached its lowest, 0, in April of this year. May has given us a mortality of only 2.

"The run of the fever in 1899 was very much like that of 1885, both giving exactly the same mortality, 111, the smallest of any in the normal ten years' series. In both there was the fairest promise, until August in 1885, September in 1899, and then an unusually rapid increase, dying down, however, more quickly in 1885 than in 1899. In the latter, indeed, we had a real winter epidemic, as in 1888 and 1892, and with the exception of these two years the three winter months of 1899–1900 give a higher mortality than the corresponding months of any of the seventeen years I have recorded.

* * * * * * *

"To my mind the cause of the increase of mortality in the fall and winter was exactly the same, reversed, as caused the low mortality in 1897 and 1898, i. e., the

changed movement of the Spanish immigration. Just as a cessation of this movement after 1895, by ceasing to supply susceptible material, gave us the low death rate (of yellow fever) of 1896, 1897, 1898, and the early part of 1899, so its recrudescence in the latter part of August, by furnishing susceptible material exposed to infection, gave us our winter epidemic of 1899."

One of the most interesting tables in the "note" is that showing the comparative mortality for five years, among civilians, of yellow fever and tuberculosis, the average per annum for yellow fever being 221 cases and for tuberculosis 1,492, so that the author feels justified in remarking that "compared with tuberculosis, the influence of yellow fever on the general mortality of the city is insignificant."

Stations.—The number of headquarters, posts, hospitals, and depots on Juue 30 requiring the services of medical officers was as follows:

Headquarters, 4; garrisoned posts, 28; yellow-fever hospitals or stations, 6; supply depots, 2.

Of the garrisoned posts 12 are in the Department of Santiago and Puerto Principe, 9 in the Department of Matanzas and Santa Clara, and 7 in the Department of Havana and Pinar del Rio.

Of the yellow-fever hospitals and stations 1 is at Santa Clara, 1 at Quemados, 1 in Havana, and 4 in the Department of Santiago and Puerto Principe.

Six medical officers are also on special duty as sanitary officers in cities, and in charge of Government employees.

Medical officers.—The medical officers on duty in the Division of Cuba on June 30 were as follows:

United States Army:	
Surgeons with rank of major	3
Assistant surgeons with rank of captain	2
Assistant surgeons with rank of first lieutenant	9
United States Volunteers:	
Surgeons with rank of major (2 being captains and assistant surgeons, United States Army)	8
Acting assistant surgeons	55
Total	77

This list presents peculiar features which call for notice. The first is the absence of medical officers above the rank of major. Another is the small number of regular medical officers, especially of major-surgeons, so that of the three department chief surgeons two are captains and assistant surgeons, with volunteer rank of major, and one is a major of volunteers.

One of the inevitable results of this scarcity of regular medical officers is that all of our large and important posts are in charge of junior commissioned officers or of contract surgeons; thus the largest post on the island, Columbia Barracks, with a garrison of 2,000 men, is in charge of an assistant surgeon with rank of captain, and so is Pinar del Rio, with a garrison of 800 or more men. Posts of four or five companies, with band and headquarters, like Rowell Barracks, Puerto Principe, Santa Clara, and Guanajay, are in charge of assistant surgeons with rank of first lieutenant. Such young officers are as able and efficient as could be expected, but necessarily lack the experience required to meet the responsible duties made to devolve upon them. But even junior officers are not sufficient for all our large garrisons, and we have such posts as Cabana, Morro Castle (Santiago), and Holguin in charge of contract surgeons.

The most striking feature of the list of medical officers submitted above is the great preponderance of civilian physicians under contract, or acting assistant surgeons. Even at posts where the surgeons are commissioned officers all their assistants, as a very general rule, are contract surgeons, so that we may correctly state that the great majority of our sick soldiers in Cuba (and elsewhere) are under the professional care of contract surgeons.

Enlisted men, especially in the Tropics, are entitled to the best medical attendance, and it is a fact that they do not and can not receive it under the present system, and that a great injustice is done them. Contract surgeons are not qualified by professional attainments or military experience and knowledge to perform successfully the duties required of them. This is so obvious to all that I need not dwell upon it. To become an efficient medical officer (that is, not only to be able to prescribe for the sick and perform operations, but to point out and remedy all causes tending to produce disease and inculcate the spirit of military discipline, without which army nurses and attendants are useless) requires several years of special study and careful

attention to duty, and this can not be expected from civilian physicians whose service in the Army is casual and temporary. The remedy for this great evil is plain enough, and I only follow in the footsteps of the Surgeon-General in recommending and urging a large increase of the regular medical corps, so that the necessity for the employment of so many contract surgeons may cease to exist.

General conclusion.—To maintain the health and efficiency of United States troops on this island requires great care and particular precautions. They must be kept away from the hot sun and only exercised or drilled in the morning and evening. Their barracks must be on high, well-drained grounds, swept by breezes, away from towns, with good and abundant water supply and excellent sewerage. In this manner all infectious diseases, including yellow fever, can be avoided. It will be impossible, however, to prevent malarial fevers, diarrheal troubles, the result of improper diet or indiscretions in food and drink, and venereal diseases. These troops will doubtless exert a strong moral effect merely by their presence, and this may be enough for their raison d'etre; but should they be required to take the field and enter upon active campaign the result from a sanitary point of view would, I fear, be disappointing. After two or three weeks' exposure to the elements it is probable enough that the experience of Santiago would be repeated; that at least one-half of the command would become disabled from malarial fevers, and that the deadly effects of yellow fever and other infectious diseases would soon be superadded.

DISINFECTION IN HAVANA.

A plant for the electrolysis of sea water, on what is known as the Woolf system, was put into practical operation in Havana in July, 1899. It was claimed that the water so treated had an average chlorine strength of 0.16 per cent, equal to 100 grains of chlorine to the gallon. This was distributed in wagons for use in disinfecting sewers, street sprinkling, and household disinfection. On the request of Maj. Gen. Leonard Wood, United States Volunteers, for an investigation into the value of this method of disinfection, Maj. Walter Reed, surgeon, United States Army, was sent to Havana to make the desired examination. Major Reed found that the chlorine strength supposed to be obtained was not reached in practice. In observations covering a period of ten days the available chlorine in the electrolysed sea water, or electrozone, varied from a maximum of 0.142 to a minimum of 0.021 per cent, or from 89.9 to 12.2 grains per gallon. A chlorine strength of less than 0.15 per cent can not be relied upon for prompt disinfection. A solution containing 0.25 per cent is, in fact, desirable. He concluded, therefore, that the electrozone as used in Havana did not possess sufficient strength for efficient and reliable disinfection. His experiments showed that a solution of sodium hypochlorite of equal chlorine percentage is just as effective in germicidal action as electrozone, and the same is true of chlorinated lime to which enough of hydrochloric acid has been added to free the whole of the chlorine. Comparing the cost of manufacture, he states that a chlorinated lime solution having a strength of 146 grains of available chlorine per gallon could have been used in Havana in quantity equal to that of the electrozone used from July 1, 1899, to March 31, 1900, at a cost of $17,802, while on the other hand the cost of the electrozone plant, the interest on this cost, and the daily expenses of management amounted to $87,033, as the cost of furnishing a like quantity of electrolysed sea water having no particular standard of strength, but certainly of a less strength than that which could have been obtained from the chlorinated lime. He therefore disapproved of the proposition to extend the Havana system of disinfection to other cities in Cuba.

REPORT OF MAJ. WALTER REED, SURGEON, UNITED STATES ARMY, ON THE PRACTICAL USE OF ELECTROZONE AS A DISINFECTANT IN THE CITY OF HAVANA, CUBA, APRIL 20, 1900.

In compliance with paragraphs 15 and 16, Special Orders, No. 51, Adjutant-General's Office, March 2, 1900, I have the honor to submit the following report embodying my investigation concerning the practical use of electrozone in the city of Havana, together with the results of tests made to determine the germicidal value of this fluid:

The plant established in Havana by the chief engineer of that department was put into practical operation during the month of July, 1899. The method used for the electrolysis of sea water is that known as the Woolf system, and may be briefly described as consisting of eight circular, open, wooden vats arranged in pairs and each capable of holding 1,000 gallons of sea water. For each of the vats there are provided fifty-two positive and fifty-three negative electrodes, the former consisting of an alloy of platinum and iridium and the latter of zinc. As stated, these circular vats are connected in pairs and both receive, at all times when in operation, the same strength of electric current. For the four pairs of vats, therefore, four dynamos are provided.

These vats having been filled at 7 a. m. with sea water, a current having a strength normally of 3,000 ampères, with a voltage of 12–13, is passed through the water for the space of two and one-half hours. At the end of this time 200 gallons (20 per cent) are drawn from each vat and passed into two open wooden receiving tanks, which stand on the street below. Two hundred gallons of sea water are then pumped into each vat to supply the place of that removed, and at the expiration of thirty minutes 200 gallons are again passed from each vat into the receiving tank. This is repeated throughout the day's run.

It is stated that by this procedure there is produced and maintained an average strength of 100 grains of available chlorine to the gallon (0.16 per cent), which would appear to be the strength desired.

The plant is at present at work during eight hours of the day, turning out, as stated by the assistant superintendent, 24,000 gallons of electrozone, having a strength of 80–100 grains of available chlorine per gallon. The capacity of the plant, if run during the twenty-four hours, is said to be 100,000 gallons of the strength above indicated.

From the receiving tanks, each of a capacity of 5,000 gallons, the disinfectant is drawn off into closed distributing carts at all hours of the day and night and carried to various parts of the city for sewer, street, and household disinfection. I was informed by Colonel Black, chief engineer, that at present about 12,000 gallons are used daily for sewer disinfection and about 8,000 gallons for street sprinkling, those streets being selected for daily sprinkling which are located in the old part of the city, where yellow fever has been more prevalent during the past years.

For the purposes of sewer disinfection certain water-tight receptacles, having a capacity of several hundred gallons, are provided in connection with the sewers, and from these, by means of a half-inch opening, a small stream of electrozone is allowed to flow into the sewer. By this method disagreeable odors have been entirely abated and a certain degree of disinfection supposedly obtained.

As regards household disinfection, I was informed by Maj. W. C. Gorgas, chief sanitary officer, that about 4,000 gallons of electrozone were being daily used for the purpose only of cleansing and disinfecting the floors of such houses as were selected for disinfection, bichloride of mercury solution being relied upon for the disinfection of walls, etc. It will thus be seen that electrozone is being put to practical use in the city of Havana for three purposes, viz, street sprinkling, sewer disinfection, and the disinfection of floors.

After a consideration of the germicidal value of this fluid, I will again refer to its use for these several purposes.

I may here state that at the time of my first visit to the plant (3 p. m. March 11) I was impressed with the fact that although a certain standard of strength as regards available chlorine was supposed to be obtained, this was not arrived at in actual practice. At my request, the assistant superintendent kindly tested, by the arsenious acid method, the fluid contained in two vats, with the result that while one gave 0.319 per cent of available chlorine, the other contained only 0.073 per cent. A test of the fluid contained in the two distributing tanks gave, for tank No. 1, 0.071 per cent of available chlorine, while that contained in tank No. 2 gave 0.060 per cent. A second test of the fluid contained in tank No. 1, made a half hour later, gave 0.142 per cent of available chlorine.

The varying strength of electrozone, as regards its available chlorine, will be best shown by the result of the tests that were made from time to time with the fluid contained in the distributing tanks.

TABLE I.

Date.	Per cent of available chlorine.		Date.	Per cent of available chlorine.	
	Tank No. 1.	Tank No. 2.		Tank No. 1.	Tank No. 2.
March 11, 3 p. m	0.071	0.060	March 19, 11 a. m	0.021	0.049
March 11, 3.30 p. m	.142		March 20, 8.30 p. m	.056	.052
March 13, 3.30 p. m	.102	.095	March 20, 10 a. m	.071	.070
March 14, 2.30 p. m	.142	.110	March 20, 4.30 p. m	.070	.070
March 15, 2 p. m	.106	.094			

Thus in observations extending over a period of ten days the amount of available chlorine varied from 0.142 to 0.021 per cent, or from 82.9 to 12.2 grains per gallon. The arsenious-acid method was used in determining the available chlorine.

As it will be later shown that the disinfectant value of electrozone depends upon the amount of its available chlorine and that the latter is rapidly lost from the solution, it can be inferred that the fluid in actual daily use must have varied markedly in its disinfectant quality.

Through the courtesy of Colonel Black I was enabled on March 20 to make a practical test as to the amount of available chlorine which could be produced by the electrolysis of sea water under this system, and on March 27 to test the capacity of the entire plant during a three hours' run.

For the first test one vat only was selected for observation, although, of course, the same strength of chlorine was probably produced in its companion vat; but sufficient time could not be given to the estimation of the strength of both vats. The conditions were favorable for the best results, as the electrodes had been thoroughly cleaned and were in good working order.

The result of this trial is given in the following table:

TABLE II.

[Strength of current, 3,000-3,500 ampères, voltage 12-14, acting upon 1,000 gallons of sea water during the period of eight hours.]

Time.	Percentage of available chlorine.	Grains of chlorine per gallon.	Time.	Percentage of available chlorine.	Grains of chlorine per gallon.
½ hour	0.046	26.87	4½ hours	0.277	161.82
1 hour	.078	45.56	5 hours	.323	188.69
1½ hours	.106	61.92	5½ hours	.351	205.05
2 hours	.129	75.36	6 hours	.379	221.41
2½ hours	.156	91.13	6½ hours	.418	244.19
3 hours	.191	111.58	7 hours	.433	252.95
3½ hours	.213	124.43	7½ hours	.443	258.80
4 hours	.248	144.88	8 hours	.454	265.22

It was observed that during this trial the strength of current supplied to the three remaining pairs of vats varied from 500 to 1,800 ampères. A test of the fluid in two of these, made at 3 p. m., gave only 0.070 per cent of chlorine. This fluid was being passed into the distributing tanks for general distribution.

The result of three hours' trial of the entire system of vats is given in the following table:

TABLE III.

Sets.	Time.	Per cent of available chlorine.	Grains of chlorine per gallon.	Strength of current.
No. 1	½ hour	0.024	14.02	
	1 hour	.056	32.71	1,900 ampères, 13 volts.
	1½ hours	.081	47.32	2,300 ampères, 13.5 volts.
	2 hours	.095	55.49	2,500 ampères, 13 volts.
No. 2	½ hour	.053	30.96	
	1 hour	.067	39.14	2,500 ampères, 12 volts.
	1½ hours	.078	45.56	
	2 hours	.110	64.26	2,950 ampères, 12.5 volts.
	2½ hours	.142	82.95	
	3 hours	.152	88.79	2,800 ampères, 12.3 volts.

TABLE III—Continued.

Sets.	Time.	Per cent of available chlorine.	Grains of chlorine per gallon.	Strength of current.
No. 3	½ hour	.031	18.11	
	1 hour	.067	39.14	
	1½ hours	.088	51.40	
	2 hours	.106	61.92	
	2½ hours	.131	76.53	2,400 ampères, 13 volts.
	3 hours	.177	103.40	2,300 ampères, 12.75 volts.
No. 4	½ hour	.042	24.53	
	1 hour	.074	43.23	
	1½ hours	.099	57.83	
	2 hours	.124	72.44	3,400 ampères, 14.2 volts.
	2½ hours	.152	88.79	2,300 ampères, 12.5 volts.
	3 hours	.188	109.82	2,250 ampères, 12.5 volts.

During this trial a heavy rain storm was prevailing which interfered with the filling of two of the vats, and hence the test with these covered a two hours' run only. A small amount of rain water entered the several vats, but not enough, it is believed, to warrant any alteration of figures. On the contrary, the result obtained in set No. 4 was higher than it would otherwise have been, owing to a leakage of about 200 gallons that occurred during the test. So that the results obtained in sets Nos. 2 and 3 may be taken to fairly represent the capacity of the entire plant during a three hours' run, under the most favorable conditions of preparation therefor. It will be seen that the available chlorine obtained amounted to 0.150 and 0.170 per cent, respectively. In other words, that 8,000 gallons of electrozone having a chlorine strength of 0.160 per cent or 93.47 grains per gallon, can be manufactured every three hours, or a possible 24,000 gallons in a nine hours' run.

This result can not be obtained, however, in the regular course of daily work, since much time must be given especially to cleaning electrodes, so that practically two vats are thrown out of use every fifth day. I believe that it would be more correct to say that the plant can produce during a nine hours' run 24,000 gallons of electrozone, having a strength of 0.150 per cent or 87.63 grains of chlorine per gallon.

I was informed by one of the gentlemen on duty in the chief engineer's office, who was present during the test, that theoretically a current of 3,000 amperes should produce 20 grains of chlorine per gallon per ampere hour. A calculation made at the end of the three hours' run showed, however, that only 12 grains of available chlorine had been obtained per ampere hour.

THE GERMICIDAL VALUE OF ELECTROZONE.

Electrolyzed sea water or electrozone is a clear fluid, having a decided odor of chlorine. Its specific gravity appears to be the same as that of the sea water from which it is made, viz, 1027. It bleaches both blue and red litmus paper. This effect is brought about more slowly by solutions containing 0.050 per cent of available chlorine, but takes place at once by solutions having a chlorine strength of 0.100 to 0.250 per cent. Its reaction appears to be neutral. Repeated transfers of small quantities of this fluid to nutritive media showed that it was sterile. In order to ascertain how long the current must flow to bring about the destruction of the bacteria present in sea water, plates on agar were made from the sea water with which the vats were filled at intervals of five minutes for the first hour and then at ten-minute intervals during the second hour. The strength of current at the beginning of the observation was 500 amperes with 11.5 volts. After five minutes it had reached a strength of 2,500 amperes 11.5 volts and after seven minutes 3,000 amperes 13.5 volts. This strength was thereafter continued during the experiment. The material for plating was taken midway between the electrodes and the edge of the vat and at a depth of about 10 inches. The result obtained is given below:

TABLE IV.

	Per c.c.		Per c.c.
Number of bacteria in specimen of sea water.	832	After 45 minutes electrolysis	0
After 5 minutes electrolysis	504	After 50 minutes electrolysis	26
After 10 minutes electrolysis	244	After 55 minutes electrolysis	26
After 15 minutes electrolysis	338	After 60 minutes electrolysis	0
After 20 minutes electrolysis	156	After 70 minutes electrolysis	0
After 25 minutes electrolysis	260	After 85 minutes electrolysis	0
After 30 minutes electrolysis	54	After 100 minutes electrolysis	0
After 35 minutes electrolysis	26	After 120 minutes electrolysis	0
After 40 minutes electrolysis	104		

It would appear, therefore, that all the bacteria present are destroyed by electrolysis at the end of about one hour. As the number of bacteria per cubic centimeter of Havana Harbor water was less than had been anticipated, a second observation was made after one week. This test gave 2,158 colonies to the cubic centimeter of sea water, or an average of 1,495 colonies for the two trials.

For the purpose of determining the germicidal value of electrozone, equal parts of this fluid and of bouillon cultures of several micro-organisms, grown in the thermostat, were mixed and transfers made to sterile bouillon tubes after intervals varying from one minute to one hour. The latter tubes were kept at thermostat temperature from ten days to two weeks and the results carefully noted.

TABLE V.

[Electrozone containing 0.050 per cent (29.21 grains) of available chlorine per gallon.]

Cultures.	Time of exposure, in minutes.															
	1.	2.	3.	5.	7.	10.	15.	20.	25.	30.	35.	40.	45.	50.	55.	60.
Staphylococcus pyog. aureus	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Typhoid bacillus	+	+	+	+	+	–	–	–	–	–	–	–	–	–	–	–
Colon bacillus	+	+	+	+	+	+	–	–	–	–	–	–	–	–	–	–

Subsequent observations showed that this strength of electrozone did not destroy staphylococcus aureus after eighteen hours' exposure.

TABLE VI.

[Electrozone containing 0.100 per cent (58.42 grains) of available chlorine per gallon.]

Cultures.	Time of exposure, in minutes.														
	1.	3.	5.	7.	10.	15.	20.	25.	30.	35.	40.	45.	50.	55.	60.
S. pyog. aureus	+	+	+	+	+	+	+	+	–	–	–	–	–	–	–
Typhoid bacillus	+	+	–	–	–	–	–	–	–	–	–	–	–	–	–
Colon bacillus	+	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Bacillus icteroides	+	+	–	–	–	–	–	–	–	–	–	–	–	–	–

TABLE VII.

[Electrozone containing 0.150 per cent (88 grains) of available chlorine per gallon.]

Cultures.	Time of exposure, in minutes.														
	1.	3.	5.	7.	10.	15.	20.	25.	30.	35.	40.	45.	50.	55.	60.
S. pyog. aureus	+	+	+	+	–	–	–	–	–	–	–	–	–	–	–
Typhoid bacillus	+	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Colon bacillus	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Bacillus icteroides	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
B. prodigiosus	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Anthrax spores	+	+	+	+	+	+	+	+	+	–	–	–	–	–	–

TABLE VIII.

[Electrozone containing 0.250 per cent (146 grains) of available chlorine per gallon.]

Cultures.	Time of exposure, in minutes.														
	1.	3.	5.	7.	10.	15.	20.	25.	30.	35.	40.	45.	50.	55.	60.
S. pyogenes aureus	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Typhoid bacillus	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Colon bacillus	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Bacillus icteroides	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Anthrax spores	–	+	+	–	–	–	–	–	–	–	–	–	–	–	–

The foregoing observations embraced in Tables V to VIII demonstrate that while solutions containing 0.050 and 0.100 per cent of available chlorine possess to a certain extent germicidal qualities these solutions can not be considered as efficient disinfectants. In order to bring about the prompt destruction of the test bacteria, solutions containing 0.150 to 0.250 per cent of available chlorine must be used. It must also be borne in mind that electrozone is a very unstable preparation, and that it rapidly loses its chlorine content, upon which its germicidal value would appear to depend. This is shown in the following table:

TABLE IX.

Date.	Per cent of available chlorine.	Date.	Per cent of available chlorine.
March 14, 3.30 p. m	0.150	March 15, 10 a. m	0.095
March 18, 4 p. m	.410	March 19, 10 a. m	.280
March 20, 6 p. m	.454	March 21, 10 a. m	.374
March 22, 10 a. m	.259	March 22, 1.30 p. m	.216

In the first two observations the sample of electrozone was contained in dark-colored bottles, tightly closed with a cork stopper; in the third it was contained in a Squibb's chloroform bottle, with ground-glass stopper, and kept in an ice box till reexamined, while in the fourth observation the fluid was purposely left in an open vessel.

To what the instability of this preparation is due, even when kept in tightly stoppered vessels, I am unable to state. It may be attributed either to further oxidation of organic matter present in the solution, or more probably to recomposition of its chemical constituents. At any rate, this unstableness of electrozone is fully appreciated by the officer in charge of the plant, and hence an effort is made to use the fluid as soon after its manufacture as possible. Since, however, it is manufactured in open vats and stored in open tanks it can not fail to continually lose its chlorine strength, and hence to reach its destination with lessened germicidal value.

By reverting now to Table I, it will be seen that the strongest preparation of electrozone found in the distributing tanks during a period of 10 days contained 0.142 per cent of available chlorine, a percentage which was to some extent lessened before its application as a disinfectant. I have already shown that a less chlorine content than 0.150 per cent can not be relied upon for prompt disinfection. A solution containing 0.250 per cent of available chlorine is to be desired. Even a solution of this strength would, after 3 to 6 hours, fall approximately to one containing 0.200 per cent of chlorine. It follows that the electrozone heretofore used in Havana has not possessed sufficient chlorine strength to have rendered it an efficient and reliable disinfectant for practical work.

In order to further test the disinfectant value of electrozone, the following experiments were made:

Experiment I.—Equal parts of electrozone (0.130 per cent chlorine) and a thin watery sewage containing 5,000,000 bacteria to each cubic centimeter were mixed. An agar plate made with one loop of the mixture gave after 1 minute 25 colonies, after 5 minutes 10 colonies, and after 1 hour 4 colonies. A bouillon transfer made after 24 hours gave a growth of nonspore-bearing bacilli.

Experiment II.—Equal parts of electrozone (0.250 per cent chlorine) and thin sewage were mixed, with the following result: Plate after one-half minute, 8 colonies; plate after 2 minutes, 2 colonies; plate after 30 minutes, 16 colonies. Bouillon transfer after 24 hours gave a growth of nonspore-bearing bacilli.

The foregoing experiments show that while these examples of electrozone, when mixed in equal parts, did not completely sterilize the sewage, the number of bacteria were promptly and markedly reduced.

Experiment III.—Electrozone (0.150 per cent chlorine) was mixed with a sample stool in the proportion of 1 part to 1 part, 2 parts to 1, 3 parts to 1, and 4 parts to 1 of the stool. The latter was made by adding 10 grams of solid fæces to 30 c. c. of urine and the two thoroughly mixed with a glass rod. Some escape of fine gas bubbles to the surface of the liquid was observed. Plates made after 2, 6, and 24 hours gave numerous colonies of the colon bacillus in all of the mixtures.

Experiment IV.—To a sample stool consisting of 10 grams of fæces and 40 c. c. of urine, well stirred, were added 150 c. c. of electrozone containing 0.280 per cent of available chlorine. There was prompt evolution of numerous fine gas bubbles, which collected as a layer at the surface, with temporary bleaching of the amber color of the mixture.

A test for the available chlorine in the latter after 3 hours gave 0.035 per cent. Plates made after 3, 12, and 24 hours gave numerous colonies.

Experiment V.—Semisolid faeces, 10 grams; urine, 20 c. c., and electrozone (0.370 per cent chlorine), 300 c. c., or in the proportion of 10 pints of this stronger electrozone to 1 pint of stool, were mixed. Bouillon transfers made after 5 minutes, 6 hours, and 24 hours gave a good growth. Agar plates made after 16 hours and 24 hours gave numerous colonies of nonspore-bearing bacilli.

The foregoing experiments would indicate that where there is much organic matter present, and especially in the form of particles of moderate size, the chlorine content of electrozone (0.370 per cent chlorine) is entirely exhausted prior to the complete disinfection of the mixture.

Where, however, this stronger electrozone is brought in contact with thoroughly decomposed fæcal material, the disinfection may be complete after a comparatively short interval, as shown in the following experiments:

Experiment VI.—To a thoroughly decomposed sewage (20,000,000 of bacteria to the cubic centimeter) consisting of fæcal matter, 1 part, and urine, 30 parts, were added varying proportions of electrozone (0.250 per cent chlorine) from 1 to 1 to 6 to 1 of sewage. The solutions made with 1 part of sewage to 5 and 6 parts of electrozone were rapidly bleached with much frothing. Transfers made to sterile bouillon after 2 hours' interval gave no growth in any of the mixtures.

Experiment VII.—To 1 part of fluid sterile faeces, with which a bouillon culture of the typhoid bacillus had afterwards been mixed, was added 4 parts of electrozone (0.250 per cent chlorine). Plates made after 10, 20, 30, and 60 minutes showed no colonies. In other words, in order that these stronger solutions of electrozone may bring about the complete disinfection of sewage the organic matter must be in a state of extremely fine suspension, which we do not ordinarily find in the practical disinfection of sewage or stools. In all the foregoing experiments, although disinfection was not accomplished in the majority, the obnoxious odors of all were promptly suppressed by the addition of electrozone.

Returning, now, to the practical use of electrozone in the city of Havana, I may say that the small quantity allowed to enter the sewers could only act as a deodorizer, and in no sense of the word as a disinfectant. Could the several sewers of the city be filled with this solution and kept full for the period of 24 hours, complete disinfection would hardly be accomplished. It is idle, then, to speak of this agent as a disinfectant for the sewage of the city.

As a surface disinfectant for walls and floors the stronger solution (0.250 to 0.450 per cent chlorine) will undoubtedly be found effective, but not the weaker solutions heretofore used. For covering the surface of material recently removed from sewers, before it can be carted away, it will accomplish good by surface disinfection and the removal of foul odors.

As regards the matter of street disinfection by sprinkling, it must be remembered that under Colonel Black's supervision the streets of Havana, as far as I was able to judge, are kept in a remarkably clean condition and quite free of all surface refuse. Under these circumstances, far more efficient disinfection is effected by direct sunlight than could be expected from the use of any disinfectant solution. Hence I can but think that the sprinkling of streets with electrozone is entirely superfluous, except for the purpose of allaying dust.

It only remains to compare the disinfectant qualities of electrozone with solutions of other hypochlorites, such as those of sodium and calcium containing the same equivalent of available chlorine.

Since my return from Havana I have been engaged in this comparison, making use of the same method for determining the available chlorine present. The results obtained are recorded below:

TABLE X.

[Solution of sodium hypochlorite, 0.100 per cent of available chlorine.]

Cultures.	Time of exposure in minutes.													
	1.	3.	5.	7.	10.	15.	20.	25.	30.	35.	40.	45.	50.	55.	60.
S. pyogenes aureus	+	+	+	+	+	+	+	−	−	−	−	−	−	−	−
Typhoid bacillus	+	−	−	−	−	−	−	−	−	−	−	−	−	−	−
Colon bacillus	+	−	−	−	−	−	−	−	−	−	−	−	−	−	−
Bacillus icteroides	+	−	−	−	−	−	−	−	−	−	−	−	−	−	−

TABLE XI.

[Solution of sodium hypochlorite, 0.150 per cent of available chlorine.]

Cultures.	Time of exposure in minutes.														
	1.	3.	5.	7.	10.	15.	20.	25.	30.	35.	40.	45.	50.	55.	60.
S. pyogenes aureus	+	+	−	−	−	−	−	−	−	−	−	−	−	−	−
Typhoid bacillus	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
Colon bacillus	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−
Bacillus icteroides	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−

TABLE XII.

[Solution of sodium hypochlorite, 0.250 per cent of available chlorine.]

Cultures.	Time of exposure in minutes.								
	1.	3.	5.	7.	10.	15.	20.	25.	30.
S. pyogenes aureus	−	−	−	−	−	−	−	−	−
Typhoid bacillus	−	−	−	−	−	−	−	−	−
Colon bacillus	−	−	−	−	−	−	−	−	−
Bacillus icteroides	−	−	−	−	−	−	−	−	−
Anthrax spores	+	+	−	−	−	−	−	−	−

TABLE XIII.

[Solution of chloride of lime, 0.100 per cent of available chlorine.]

Cultures.	Time of exposure in minutes.														
	1.	3.	5.	7.	10.	15.	20.	25.	30.	35.	40.	45.	50.	55.	60.
S. pyogenes aureus	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Typhoid bacillus	+	+	+	+	−	−	−	−	−	−	−	−	−	−	−
Colon bacillus	+	+	+	+	−	−	−	−	−	−	−	−	−	−	−
Bacillus icteroides	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

TABLE XIV.

[Solution of chloride of lime, 0.150 per cent of available chlorine.]

Cultures.	Time of exposure in minutes.														
	1.	3.	5.	7.	10.	15.	20.	25.	30.	35.	40.	45.	50.	55.	60.
S. pyogenes aureus	+	+	+	+	+	+	−	−	−	−	−	−	−	−	−
Typhoid bacillus	+	+	−	−	−	−	−	−	−	−	−	−	−	−	−
Colon bacillus	+	+	−	−	−	−	−	−	−	−	−	−	−	−	−
Bacillus icteroides	+	+	+	−	−	−	−	−	−	−	−	−	−	−	−

TABLE XV.

[Solution of chloride of lime, 0.250 per cent of available chlorine.]

Cultures.	Time of exposure in minutes.								
	1.	3.	5.	7.	10.	15.	20.	25.	30.
S. pyogenes aureus	+	+	+	+	−	−	−	−	−
Typhoid bacillus	+	−	−	−	−	−	−	−	−
Colon bacillus	+	−	−	−	−	−	−	−	−
Bacillus icteroides	+	+	+	−	−	−	−	−	−
Anthrax spores	+	+	+	+	+	+	+	+	+

An examination of the foregoing observations (Tables X–XV) will serve to show that while the solutions of sodium hypochlorite (Labarraque's solution), of equal chlorine percentage, were just as effective in germicidal action as electrozone, the solutions of chlorinated lime were much less efficient in their disinfectant qualities; a solution containing 0.250 per cent of available chlorine requiring not less than 10 minutes to destroy staphylococcus pyogenes aureus and 35 minutes to kill anthrax spores.

In seeking an explanation of this marked difference in action between solutions of electrolyzed sea water and those of bleaching powder, I think that we must take into consideration the difference in the comparative bleaching action of these two solutions. Electrozone bleaches instantly; solutions of chlorinated lime, on the contrary, bleach slowly. In other words, the chlorine content of electrozone would seem to exist as a very unstable hypochlorite, or as free chlorine, which would account not only for its prompt bleaching action but also for the instability of this fluid. On the other hand, calcium hypochlorite is a more stable compound and gives off its chlorine slowly.

If, however, to the solutions of chlorinated lime there is added a small quantity of acid, such as dilute hydrochloric acid, so as to set free its chlorine and bring the latter into solution, while still preserving the alkalinity of the fluid, then we find that its bleaching effect is just as prompt as solutions of electrozone. Not only this, but its germicidal action is just as effective as electrozone having the same chlorine content.

The following tables will serve to confirm this statement:

TABLE XVI.

[Solution of chlorinated lime containing 0.100 per cent of available chlorine as free chlorine.]

Cultures.	Time of exposure, in minutes.													
	1.	3.	5.	7.	10.	15.	20.	25.	30.	35.	40.	45.	50.	55.	60.
S. pyogenes aureus	+	+	+	+	+	+	–	–	–	–	–	–	–	–	–
Typhoid bacillus	+	+	–	–	–	–	–	–	–	–	–	–	–	–	–
Colon bacillus	+	+	–	–	–	–	–	–	–	–	–	–	–	–	–
Bacillus icteroides	+	–	–	–	–	–	–	–	–	–	–	–	–	–	–

TABLE XVII.

[Solution of chlorinated lime containing 0.150 per cent of available chlorine as free chlorine.]

Cultures.	Time of exposure, in minutes.								
	1.	3.	5.	7.	10.	15.	20.	25.	30.
S. pyogenes aureus	+	+	+	–	–	–	–	–	–
Typhoid bacillus	+	–	–	–	–	–	–	–	–
Colon bacillus	+	–	–	–	–	–	–	–	–
Bacillus icteroides	+	+	–	–	–	–	–	–	–

TABLE XVIII.

[Solution of chlorinated lime containing 0.250 per cent of available chlorine as free chlorine.]

Cultures.	Time of exposure, in minutes.					
	1.	3.	5.	7.	10.	15.
S. pyogenes aureus	–	–	–	–	–	–
Bacillus icteroides	–	–	–	–	–	–
Anthrax spores	+	+	+	–	–	–

It will be seen, therefore, that chloride of lime to which hydrochloric acid has been added in the proportion of 40 parts by weight of the acid to 100 parts of lime, has been rendered, by the liberation of its chlorine, as effective in disinfectant qualities as electrozone. As care was taken to preserve the alkalinity of the solution, its germicidal action could not be attributed in any respect to free hydrochloric acid, but only to the chlorine remaining in solution as free chlorine.

Since chloride of lime and hydrochloric acid are agents that can be readily procured in large quantities and easily stored for use, it does not seem inappropriate to compare the cost of this disinfectant with the cost of electrozone. The latter preparation, I was informed by Colonel Black, was manufactured at a cost of 1.2 mills per gallon; and that to manufacture an electrozone of 0.250 per cent chlorine strength would cost about 2.6 to 2.8 mills per gallon.

It must be remembered that in making this estimate no account has been taken of the original cost of the plant, amounting to $75,000, nor of the interest on this sum ($4,500 per annum), nor of the depreciation of the plant, generally computed at 10 per cent per annum. Only the actual daily operating expenses ($37 per day) have been considered.

It is believed that the following calculations will closely approximate the relative cost of chlorinated lime and electrozone as disinfectants: To 1 pound of chloride of lime (7,000 grains), 3 cents; 1 pound of hydrochloric acid, 3½ cents. Seven thousand grains of chloride of lime, containing 35 per cent, or 2,450 grains of available chlorine, would make 16.78 gallons of a disinfectant, having a strength of 0.250 per cent, or 146 grains of chlorine per gallon. Deducting 1.78 gallons as loss of chlorine in making the preparation, we have: To 15 gallons of disinfectant, 1 pound of lime, 3 cents; 15 gallons of disinfectant, one-half pound of hydrochloric acid, 1.75 cents; total, 4.75 cents; or at a cost of 3.17 mills per gallon, or for 24,000 gallons, a cost of $76.08 per diem.

Since July 1, 1899, to March 31, 1900—234 working days—the total expenditure would have been $17,802 for sufficient chloride of lime and hydrochloric acid to have supplied a disinfectant having 146 grains of available chlorine per gallon.

On the other hand, we have the following:

Plant	$75,000
Interest at 6 per cent for 9 months	3,375
Daily expenses, $37 for 234 working days	8,658
	87,033

as the cost of supplying daily for 234 working days 24,000 gallons of electrozone, having no particular standard of strength as regards available chlorine, but certainly of a less strength (see Table I) than 0.150 per cent.

It seems fair to conclude, therefore, that had the sanitary authorities of Havana resorted to chloride of lime as the disinfectant instead of electrozone, the work of disinfection would have been more thoroughly carried out and the insular funds would have been richer by $69,231.

In carrying out the experimental part of this report I desire to state that I have received valuable aid from Acting Asst. Surgs. A. Agramonte, Jesse Lazear, and James Carroll, United States Army.

THE DEPARTMENT OF PORTO RICO.

HEALTH OF THE TROOPS.

In this department, with a mean strength of 5,693 regulars and volunteers during the year 1898, the admissions to sick report were equivalent to 2,574.21 per thousand of strength, and the death rate from all causes to 48.48 per thousand. Injuries contributed only 126.82 to the admission rate and 2.46 to the death rate, while gunshot injuries gave only 9.48 and 1.58, respectively. Malarial infections and diarrheal diseases contributed equally to the large rate of admission, the one 772.35 and the other 767.61 per thousand of strength, with mortality rates of 3.86 and 1.41 per thousand. Typhoid fever was the important factor as regards both prevalence and mortality, for 1,678 admissions with 197 deaths gave the respective rates of 294.74 and 34.60 per thousand of strength. Seven cases of smallpox with 2 deaths were reported during the year.

During the year 1899, with a mean strength of 3,727 regulars and volunteers, the admissions to sick report were equivalent to 2,522.40 per thousand strength, but the character of the cases were so much

lighter than those of the preceding year that the death rate fell from 48.48 to 11.27 per thousand of strength. Injuries contributed 266.43 to the admission rate and 2.15 to the death rate, while gunshot injuries gave only 5.37 and 0.54, respectively. Diarrheal diseases added 542.80 to the admission rate, but gave only 2.68 to the death rate. Typhoid fever increased the death rate by 2.68, but gave only 15.03 to the admission rate, as compared with the excessive rates 34.60 and 294.74 of the previous year. Malarial infections added 458.84 to the admission rate, but no case proved fatal. There were 286.29 admissions for venereal disease per thousand men present during the year, with 25 men discharged for disability, equaling a loss of 5.63 men per thousand of strength. Seven cases of smallpox, none fatal, were reported during the year.

SEASONAL PREVALENCE OF DISEASE.

In Porto Rico in 1899 the mean monthly rate of admission to sick report for disease was 188 per thousand of strength. The minimum rate, 145.62, was recorded in February, the maximum, 270.69, in April. The rates continued above the mean in May, June, and July. During the other months they were about or below the mean. The excess of cases in April was due to alcoholism and venereal diseases.

The mean monthly death rate was 0.76 per thousand of strength. During April, May, June, July, August, and October the rates were above this figure, the maximum, 1.41, in August. No death occurred in the command in March. The small number of men constituting the army of occupation deprives these rates of value as indices of climatic influences. They are given in the following table:

Diseases.	January.				February.				March.			
	Cases.		Deaths.		Cases.		Deaths.		Cases.		Deaths.	
	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.
Typhoid fever	10	1.60	2	0.32	12	1.77	2	0.30	4	0.79	.....	.....
Malarial infections	314	50.22	.....	.....	249	36.81	.....	.....	153	30.28	.....	.....
Undetermined fevers	5	.80	.....	.....	4	.59	.....	.....	7	1.39	.....	.....
Rheumatic affections	57	9.12	.....	.....	36	5.32	.....	.....	39	7.72	.....	.....
Consumption	3	.48	.....	.....	.....	.....	1	.15	3	.59	.....	.....
All venereal diseases	145	23.19	.....	.....	120	17.74	.....	.....	143	28.30	.....	.....
Alcoholism and direct results	29	4.64	.....	.....	19	2.81	.....	.....	16	3.17	.....	.....
Diarrheal diseases	304	48.62	1	.16	223	32.97	2	.30	162	32.06	1	0.20
Pneumonia	.....	.....	.....	.....	1	.15	.....	.....	1	.20	.....	.....
Total respiratory	47	7.52	.....	.....	55	8.13	.....	.....	31	6.13	.....	.....
All diseases	1,190	190.31	4	.64	985	145.62	5	.74	879	173.96	3	.59

Diseases.	April.				May.				June.			
	Cases.		Deaths.		Cases.		Deaths.		Cases.		Deaths.	
	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.
Typhoid fever	1	0.35	.....	.....	9	2.55	.....	.....	2	0.64	1	0.32
Malarial infections	120	42.09	.....	.....	82	23.24	.....	.....	134	42.64	.....	.....
Undetermined fevers	10	3.51	.....	.....	7	1.98	.....	.....	7	2.23	.....	.....
Rheumatic affections	30	10.52	.....	.....	20	5.67	.....	.....	17	5.41	.....	.....
Consumption	.....	.....	1	0.35	2	.57	.....	.....	2	.64	1	.32
All venereal diseases	108	37.87	.....	.....	94	26.64	.....	.....	76	24.18	.....	.....
Alcoholism and direct results	21	7.36	.....	.....	19	5.39	.....	.....	21	6.68	.....	.....
Diarrheal diseases	124	43.48	1	.35	212	60.09	1	0.28	294	93.54	1	.32
Pneumonia	1	.35	.....	.....	3	.85	1	.28	.....	.....	.....	.....
Total respiratory	27	9.46	.....	.....	36	10.20	1	.28	24	7.63	.....	.....
All diseases	772	270.69	4	1.40	707	200.40	3	.85	826	262.81	4	1.27

Diseases.	July.				August.				September.			
	Cases.		Deaths.		Cases.		Deaths.		Cases.		Deaths.	
	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.
Typhoid fever	9	3.13	3	1.04	1	0.35	1	0.35	1	0.35	.....	.....
Malarial infections	144	50.02	.....	.....	109	37.79	.....	.....	54	18.76	.....	.....
Undetermined fevers	1	.35	.....	.....	1	.35	.....	.....	.....	.....	.....	.....
Rheumatic affections	15	5.21	.....	.....	25	8.67	.....	.....	25	8.68	.....	.....
Consumption	.....	.....	.....	.....	2	.69	.....	.....	2	.69	.....	.....
All venereal diseases	80	27.79	.....	.....	65	22.54	.....	.....	49	17.02	.....	.....
Alcoholism and direct results	11	3.82	.....	.....	10	3.47	.....	.....	7	2.43	.....	.....
Diarrheal diseases	152	52.80	1	.35	107	37.10	.....	.....	128	44.46	.....	.....
Pneumonia	.....	.....	.....	.....	1	.35	.....	.....	1	.35	.....	.....
Total respiratory	17	5.90	.....	.....	20	6.93	.....	.....	12	4.17	.....	.....
All diseases	648	225.08	4	1.39	509	176.49	2	.69	434	150.75	.....	.....

Diseases.	October.				November.				December.			
	Cases.		Deaths.		Cases.		Deaths.		Cases.		Deaths.	
	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.	No.	Ratio.
Typhoid fever	3	1.05	.....	.....	3	1.07	.....	.....	1	0.35	1	0.35
Malarial infections	95	33.40	.....	.....	147	52.33	.....	.....	108	38.09	.....	.....
Undetermined fevers	1	.35	.....	.....	2	.71	.....	.....	.....	.....	.....	.....
Rheumatic affections	10	3.51	.....	.....	23	8.18	.....	.....	13	4.58	.....	.....
Consumption	1	.35	.....	.....	2	.71	.....	.....	2	.71	.....	.....
All venereal diseases	65	22.85	.....	.....	51	18.16	.....	.....	71	25.04	.....	.....
Alcoholism and direct results	7	2.46	.....	.....	11	3.92	.....	.....	13	4.58	.....	.....
Diarrheal diseases	121	42.55	2	0.70	95	33.82	.....	.....	101	35.62	.....	.....
Pneumonia	.....	.....	.....	.....	1	.36	.....	.....	1	.35	.....	.....
Total respiratory	10	3.51	.....	.....	17	6.05	.....	.....	17	5.99	.....	.....
All diseases	494	173.70	4	1.41	497	176.93	.....	.....	467	164.67	1	.35

THE HURRICANE OF AUGUST 8, 1899.

According to the report of the chief surgeon, the salient feature of the year in Porto Rico was the hurricane of August 8, 1899. Barracks and hospitals were destroyed or much damaged at most of the posts. Many men were injured, but fortunately only one man belonging to the Army lost his life as a result of the cyclone. At Cayey the military hospital was destroyed, but the patients had been removed twenty minutes before the fall of the building. At Mayaguez the hospital was unroofed and the walls so strained that their fall seemed imminent. At Humacoa the barracks were destroyed and one man was buried in the ruins, while one end of the hospital was blown down and several men were injured. At Lares the hospital building was unroofed.

The Santa Rosa Hospital for indigent sick in San Juan was so badly damaged as to give no protection to its inmates. Capt. George M. Wells, assistant surgeon, United States Army, commanding the general hospital in the city, immediately transferred the exposed patients to his hospital, where they were cared for until returned to their own establishment, September 5. Much suffering was relieved by the prompt action of this officer. Again, at Ponce, where the destruction of property and loss of life occasioned by the storm were excessive, a tent hospital of 125 beds was established by Lieut. B. K. Ashford, assistant surgeon, United States Army, for the shelter and treatment of the sick who would otherwise have been uncared for. Much relief was given by this extemporized hospital.

Following these prompt efforts for the relief of local sufferers from the hurricane came an organized system by which nearly 200,000 people were kept from starvation for several months, and the medical

officers of the Army were the chief agents by which this work was accomplished. From September 16, 1899, to January 22, 1900, the average number of destitute people fed each day was reported as 182,195. The total cost of the relief work was something over a million dollars expended for food and transportation, with practically no expense for personnel.

MUNICIPAL SANITATION.

The duties of our Army medical officers in this department would have been light during the past year had they been restricted to the care of the sick and wounded of the Army and the supervision of sanitary conditions affecting their commands; but there was placed upon these officers the responsibility for the welfare of the whole civil population. All the troops were in garrison under conditions of peace, with improvements steadily going on as to quarters, drainage, water supplies, and other matters affecting their sanitary condition, so that in June, 1900, the sick list at San Juan comprised only 4.5 per cent of the command; at Ponce, 2.6 per cent; at Mayaguez, 5.2, and at Cayey, 3.7, these being four of the largest posts in the department. But the sanitary supervision of the towns and districts in which the military posts were established was imposed upon these medical officers, who accepted their new and unusual duties with cheerfulness and devoted their energies to their successful fulfillment. A superior board of health for the island was constituted by General Orders, No. 91, headquarters Department of Porto Rico, June 29, 1899, to which all local boards of health were required to report. Maj. John Van R. Hoff, surgeon, United States Army, chief surgeon of the department, was appointed president of the board, and under his able and energetic management a modern sanitary code was given to the island. The duties of this board were announced in General Orders, No. 102, headquarters of the department, July 18, 1899, as follows:

It shall be the duty of the superior board of health:

I. To have general supervision of all the interests of the public health of the island, and to especially study its vital statistics.

II. To make sanitary investigations and inquiries respecting the causes of disease, and especially of epidemic diseases, including those of domestic animals, the sources of mortality, and the effects of localities, employments, condition, habits, food, beverages, and medicine on the health of the people.

III. To disseminate information upon these and similar subjects among the people.

IV. To institute sanitary inspections of all public institutions or places throughout the island.

V. To consider and report to the governor upon the plans and specifications for all new water supplies, drainage, sewerage plants, and public institutions of all kinds, or for alterations in such public works or institutions. Copies of such plans and specifications will be filed in the office of the board.

VI. To suggest amendments to the sanitary laws of the island and to have power to enforce such regulations as will tend to limit the progress of epidemic diseases.

VII. To have power and authority to order nuisances or the causes of any special diseases or mortality to be abated and removed, and to enforce such interior quarantine regulations as said board shall direct in cities, municipalities, districts, or places where there are no local boards of health, or in case the sanitary laws or regulations should be inoperative in places where boards of health or health officers exist. Any person who shall fail to obey or shall violate such order shall, upon conviction, be sentenced to pay a fine of not more than $100 or be imprisoned for not more than sixty days, at the discretion of the court.

VIII. To have general supervision of the insular system of registration of births, marriages, and deaths, and of prevalent diseases, and to insure the faithful recording of the same; also to prepare the necessary methods, forms, and blanks for obtaining and preserving such statistics.

IX. To prepare regulations governing the admittance of persons to the practice of medicine and surgery, pharmacy, dentistry, midwifery, embalming, and undertaking, and to enforce such regulations as are adopted by the government of the island.

X. To inquire into and report upon violations of laws governing the purity and wholesomeness of foods, drinks, drugs, and medicines. To submit, through the governor of the island, regulations to control offensive and dangerous occupations, and to report upon and make recommendations regarding any special sources of danger to life or person.

XI. To require all health officers and health boards throughout the island to forward to the superior board copies of all their reports and publications, and such other sanitary information as it may request. To require reports and information concerning such matters or particulars, in respect to which it may, in its opinion, need information for the proper discharge of its duties, from all public dispensaries, hospitals, asylums, infirmaries, prisons, penitentiaries, schools, and from the managers, principals, and officers thereof, and from all other public institutions, their officers and managers, and from the proprietors, managers, lessees, and occupants of all places of public resort throughout the island.

XII. To from time to time engage suitable persons to render sanitary service, or to make or supervise practical and scientific investigations and examinations requiring expert skill, and to prepare plans and reports relating thereto. This regulation must not be considered as authorizing any expenditure beyond the sum specifically alloted to the board for such purposes in the annual budget. When the cost of such investigations exceeds the allotment, special authority for the expenditure must be obtained from the governor of the island.

XIII. To make a written report to the governor on or before June 30 of each year, covering the general sanitary conditions of Porto Rico, the work of the officers and agents of the board, and a detailed statement by the treasurer of all moneys received and disbursed during the year. To submit special reports from time to time, as the occasion may demand.

XIV. To especially supervise subjects directly relating to public health, as follows:

1. Public water supplies.
2. Markets, bakeries, groceries, and milk depots.
3. The purity and wholesomeness of all foods, drinks, liquors, drugs, and medicines.
4. Public institutions, schools, asylums, jails, hospitals, dispensaries, barracks, court rooms, theaters, etc.
5. Tenement houses.
6. Vital statistics, marriages, births, deaths.
7. Licensing and registration of physicians and surgeons, dentists, pharmacists, midwives, undertakers, etc.
8. Plumbing and registration of plumbers.
9. Sewering.
10. Street cleaning.
11. Privies, water-closets, cesspools, etc.
12. Nuisances.
13. Slaughterhouses, stables, yards.
14. Contagious and infectious diseases.
15. Trades, factories, and industries offensive or injurious to the public health.
16. Undertaking and cemeteries.
17. Disinfection.
18. Licenses and permits.
19. Vaccination and the production of vaccine virus.
20. Diseases of domestic animals communicable to man.
21. Interior quarantine.
22. Poisons, explosives, and special sources of danger to life and person.
23. Sanitary supervision of travel and traffic.

XV. To institute prosecutions for violations of the provisions of this order in the nearest local court or in the United States provisional court, as the governor may direct.

By command of Brigadier-General Davis:

W. P. HALL, *Adjutant-General.*

At the time of our occupation of the island the prevalence of smallpox was so general that quarantine had been declared by the neighboring islands against the seaports. The disease existed in every direction, and was a constant menace to the people and a detriment to

their material interests. A general vaccination of the whole population was systematically carried into effect, the vaccine being provided from a farm established at Coamo Springs. This extensive work was finished June 30, 1899; 742,062 vaccinations and 116,955 revaccinations were recorded. The disease was suppressed. No death from smallpox has been reported in the island for the past eight months. Again, while much of the pernicious anæmia which is so prevalent and fatal among the native population is certainly due to an impoverished diet, it has been shown by Lieut. B. K. Ashford, assistant surgeon, United States Army, that a great deal of the prostrating diarrhea and progressive emaciation, which has usually a fatal ending, is due to the irritating presence in the intestines of a number of minute worms (ankylostoma duodenalis), which can be easily got rid of by appropriate medication. (See page 274.) This disease has been extremely fatal, but its ravages will now be controlled under the supervision of local boards of health. These boards, acting under the instructions of the supreme board at San Juan, have done much to improve sanitary conditions and lessen sickness and mortality among this poverty-stricken people.

The superior board of health has prescribed an examination and license for all physicians, dentists, pharmacists, practicantes, midwives, and nurses now practicing in the island. It has appointed sanitary inspectors in every district, from whom regular reports of sanitary conditions are received. It has established a laboratory for the examination of food and drugs. It is collecting and collating the vital statistics of the country, and it has published several circulars or bulletins on the proper treatment of the prevalent diseases.

The work of the Medical Department of the Army in the Department of Porto Rico during the past year has added an exceedingly gratifying page to its history. The annual report of the chief surgeon, Maj. John Van R. Hoff, surgeon, United States Army, dated July 24, 1900, is herewith submitted:

The salient feature of the year in Porto Rico was the hurricane of San Ciriaco, which occurred August 8, 1899, and the history of which is known to the world. Fortunately for the troops, but one of the 2,750, more or less, reported to have died as the result of that cyclone belonged to the Army. This is indeed remarkable when the widespread destruction, involving barracks, hospitals, and quarters, is considered. At Humacao the cavalry barracks were crushed to the earth, and beneath them Private Harry J. Barker, Troop C, Fifth Cavalry, lost his life. At Cayey the barracks and hospital were literally blown off the earth, while at Aibonito nothing but shapeless ruins marked the spot where shortly before stood apparently substantial stone structures. At Mayaguez the hospital was so wrecked and shattered that its immediate abandonment was found necessary, and at almost all other stations more or less damage was suffered.

The following report from Dr. H. A. Eberle, post surgeon at Cayey, written on the very day of the hurricane, gives a startling glimpse of the then occurring conditions:

"I have the honor to report the complete destruction of the post hospital at Cayey, Porto Rico, at half past 6 this morning. The sheet iron roofing of the west end of the hospital was carried away, and, fearing that the whole structure would go, I removed patients, three in number, to my house. It was a fortunate move, for in twenty minutes thereafter the entire roof was carried away, the walls staggered, and in a few minutes fell on the floor of the hospital, burying the beds, bedding, tables, medicines, books, reports, linen, blankets—in fact, everything that the hospital contained. Several accidents happened to the men—severe cuts and broken bones. All the wounded men are in my rooms and are being cared for. Our new supplies arrived last night and were stored in the basement of the building now used as a kitchen. The walls have fallen over these supplies, and we are not able to predict their condition.

"Until a complete examination is made of what can be saved from the débris I will not ask for any supplies.

"The town has suffered incalculably, as there is not a house in the city which is not totally or seriously damaged.

"Of course the barracks are ruined and the stables down, but Captain Foster is improvising quarters for the best comfort of the troops.

"The storm is still raging at this hour, 5 p. m."

On the 10th the foregoing report was supplemented, as follows:

"I have the honor to state that since yesterday morning we have been providing quarters for the sick and wounded, purchasing supplies and rations, and gathering from the wrecked hospital some needful medicines.

"Sufficient cots and mattresses have been secured for present need. The bed linen and pillows were soaked and much damaged. Washerwomen were employed to-day to clean the linen. The captain provided a room in the stable suitable for six cots.

"Our books are all water-soaked and unfit for any kind of use whatever. We need a complete outfit of blank books, and I have no information slips on which to make requisition.

"The medical and surgical chests lie under tons of rock and mortar, and are supposed to be crushed, water-soaked, and unfit for service.

"The health of the troop is good, and seven only figure on our improvised medical register.

"A requisition for medical supplies will follow as soon as possible, and only the most needful articles will be asked for, as our room is too small to store many.

"There have been 34 bodies brought into the cemetery for burial, 28 of whom died from starvation, 6 killed from falling timbers.

"There is much destitution here and food is greatly more needed than clothing. Mrs. Eberle and daughters have employed their time in clothing and feeding a few of the most destitute.

"The shacks of the poor were totally ruined and they are absolutely without shelter. Unorganized contributions, if speedily sent, would do a world of good and perhaps save many from starvation."

On August 9 the surgeon at Mayaguez reported as follows:

"I have the honor to inform you that on August 8, 1899, the post hospital at Mayaguez was damaged to such an extent by a tornado that it was necessary to remove the patients to the barracks during the height of the storm. In each of the wards the walls were cracked and injured to such a degree that they could be seen swaying back and forth with the wind. One partition, that between the squad room and the Hospital Corps dining room, fell and several members of the corps narrowly escaped serious injury. Parts of the other walls have since fallen and considerable damage has been done to the medical property. The veranda in the inner court was completely torn away on the east and south sides, and damaged on the two other sides. The first damage done was the blowing away of a portion of the tin roofing from the veranda. This occurred about 10 a. m. and from that time the wind increased in severity until 11.30 a. m., when the partition in the squad room fell. About this time the other walls began to crack and the patients were hurried over to a room on the first floor of the barracks, as it seemed that the whole building would be destroyed. The hospital building is damaged in such a manner that after an inspection by the commanding officer this morning it was considered unsafe for occupancy until very extensive repairs have been made. The patients are for the time being comfortably situated in the barracks, and a building has been rented in the city to be used as a hospital. As soon as it is properly policed and arranged the patients will be moved there."

On the same date the surgeon at Humacao reported:

"I have the honor to inform you that during the tornado three men of Troop C, Fifth Cavalry, were seriously wounded. Harry J. Barker, internal injuries, abdominal, serious; Joseph Foutaine, dislocation of hip (reduced under ether) and two scalp wounds, severe; Hugh J. Clark, fracture (comminuted), both bones left forearm, scalp and face wounds, contusion right hip and thigh, severe. All three received injuries by being buried under fallen brick wall. No others belonging to this command have been badly injured; several sprained ankles, wounds, contusions, etc., but none severe. Officers are all well. The hospital roof is in bad condition, but has been patched until it is now the best in town except the jail. One end of building was blown out, but has been since boarded up. We are, compared to others, very well off. I have not lost medicines or dressings to any extent, and supply has been sufficient to meet all demands so far."

On August 12 the surgeon at Lares wrote:

"I have the honor to report that the recent storm which visited Porto Rico caused considerable damage to this post. There were four men sick in this hospital at the time, none serious. The storm completely unroofed the building, admitting the rain in torrents; but one room which had been fitted up for the operating room was fairly dry and the sick occupied that. Acting Steward McCleery and the three privates of the Hospital Corps at this post all conducted themselves in a creditable manner, looking out for the comfort of the patients and protecting as well as they could the property of the Medical Department. The blankets and bedding were kept dry, as were many perishable articles, but some loss has been sustained, just how much I am unprepared to state at present.

"All telegraphic and mail communication is cut off for the time being, mail being received only from Aguadilla.

"The hospital, Ponce, suffered slight damage to the walls, and that at San Juan had the windmill destroyed."

From the foregoing it will be seen that considering the extent of the damage, the loss of life was remarkably small.

Fortunate as we were, the hurricane had a distinctly deleterious effect upon the command, which manifested itself throughout all departments, and postponed the attainment of the highest degree of efficiency, both sanitary and otherwise, which the beginning of the fiscal year promised. For the most part we have been Samaritans, not soldiers, ministering to the wants of a starving population, and struggling to keep alive those who, in accordance with the Draconian laws of nature, should have made room for a fitter people. But who can say that this was not a higher duty than the perfecting of details which make up a military machine.

The details lack polish, but 100,000 people more are alive in Porto Rico to-day than would have been had not the Army turned itself into a purveyor of beans, rice, codfish, and old clothes.

However, the Medical Department has not "marked time," for there has been a distinct lessening in the number of sick and dead, which is the true measure of its value. In July, 1899, the total sick equaled 8.4 per cent of strength, while in June, 1900, it was but 4.3 per cent. The daily average for the first six months of the year was 7.6 per cent, and for the second six months 4.7 per cent, the latter as against 6.4 per cent for the last six months of the fiscal year 1899. The total number of cases under treatment for the year was 7,758 and the average daily noneffectiveness from sickness was 210.

The total number of deaths was 33, being at the rate of 10.6 per thousand per annum. The causes of deaths were, killed by natives, 4; dysentery, 3; typhoid fever, 8; cerebro-spinal meningitis, 2; remittent fever, 1; septicæmia, 1; pneumonia, 2; cardiac embolism, 1; rheumatic fever, 1; accidents, 3; suicide, 4; apoplexy, 1; gastro-enteritis, 1; heart failure, 1. Total 33.

The total number of discharges on surgeon's certificate, exclusive of those under paragraph 844, Army Regulations, was 72, and 28 recruits (Porto Rico) were discharged under this paragraph. The causes of discharge were: Tuberculosis, 11; venereal, 19; varicocele, 4; insanity, 8; epilepsy, 3; gonorrheal rheumatism, 1; hernia, 10; catarrh of stomach, 1; corns and sore feet, 1; recurrent appendicitis, 1; flat foot, 1; heart disease, 2; chronic arthritis, 2; chronic eczema, 2; injuries, 4; blindness 2.

Prevailing diseases.—June 30, 1900, there remained under treatment 151 cases, of which 7 were typhoid, 20 digestive, 48 venereal, and 21 malarial; from which it will be seen that the same diseases continue to preponderate, and in the same order. During the year there were under treatment 2,011 cases of digestive diseases, 1,480 cases of venereal diseases, and 1,235 cases of malarial diseases. Sixty cases of typhoid fever were treated during the year, of which number 8 died. Besides the foregoing the only infectious diseases reported were: Measles, 22 cases; dengue, 53; erysipelas, 3; and cerebro-spinal meningitis, 1, of which only the latter died. While digestive diseases still claim the largest share of total sickness, there has been a marked decrease in the rate per thousand, which is 649 against 916 last year. The reason for this is quite apparent, and the improvement would have been much more marked had the hurricane not occurred. The men had settled down to peace conditions and were living the usual comfortable garrison life—ample shelter, sufficient clothing, proper food. While the cyclone interfered to a certain extent with all of these, it destroyed the fruit, which may be considered an offset.

Venereal diseases still maintain their unenviable prominence, the annual rate being 478 per thousand, against 467 last year. It is interesting to observe that these diseases are quite as prevalent among the Porto Rico volunteers as among the regular troops, which supports the position taken in my last annual report, that the people here are syphilized.

Perhaps no more startling proof can be given of this than that deduced from the last census and published in Bulletin No. 2, as follows: "The persons over 45 years of age in Porto Rico were only 11.8 per cent of the entire population. This is in marked contrast to the United States, where persons over 45 were 17.2 per cent of the total population, and also to other countries. Thus in India this class was nearly 15 per cent and in Cuba 14.2 per cent of the total population."

To be sure, in spite of this, the population has steadily increased up to last year, when the death rate exceeded the reported birth rate. Perhaps sufficient was said on this subject in my last annual report, but this danger to home communities from returning soldiers is a constant threat which not only concerns us, but will reach even unto the third and fourth generation. The efforts to control prostitution have been noneffective because of the inefficiency of the means and the indifference of public opinion. If syphilization is so general here, why should the Porto Ricans interest themselves to prevent the United States soldier from becoming syphilized?

As was to be expected, the records show considerable improvement in malarial diseases—440 per thousand, against 509 last year. This will continue to improve, as the hurricane undoubtedly indirectly increased the number of cases. It may be well to note the fact that the Porto Rico volunteers show proportionately a much larger number of cases than the regular troops. In fact, their sick rate is higher all along the line, except at Cayey, where, in comparison with the former garrison, the present command has an excellent health record.

Up to the present time there has been no epidemic in Porto Rico. Immediately following the hurricane, dysentery occurred extensively among the people, especially in the uplands, and a large number died, but this did not extend to the troops.

The conditions now obtaining here, which accentuate the hunger, filth, misery, and want which are the common heritage of 800,000 Porto Ricans, are ripe for an epidemic, needing only the match to start the conflagration. To prepare for all contingencies, sites for camps of refuge for all garrisons have been designated and the post commanders directed to make the necessary arrangements for immediate evacuation. The following circular was issued from this office May 21, 1900:

"In view of the approach of the sickly season and the possibility of an epidemic occurring which might require the immediate evacuation of your post, you will at once assemble all the material necessary for the establishment of a field hospital adequate to the requirements of your command, and keep it always ready for immediate mobilization. You will predetermine what men of your detachment will be attached to this hospital, what duties they will perform, what clothing they will take, how they and the field hospital will be transported—in fact, everything necessary—and will make full memorandum, so that should an order to move reach you there will be no confusion and nothing forgotten.

"In order to assure yourself that everything is provided and to enable your men to become acquainted with the material of the hospital, the pitching of tents, loading and unloading of the material, etc., you will from time to time cause your field hospital to be pitched and all the material pertaining to it placed therein exactly as it would be in case of actual use. Should you lack anything pertaining to such a hospital, as laid down in Manual, Medical Department, or elsewhere, you will at once make requisition on the proper department for it, and if it can not be obtained you will report the fact to this office."

The question of a permanent infectious-disease hospital at San Juan is still subjudice, and fortunately up to the present time there has been no occasion for one. With the reduction of the garrison the building designed and constructed by the Spaniards as a yellow-fever hospital, but used by us as barracks, could be put to the use for which intended should the necessity demand. In the meantime, to meet any ordinary emergency the following recommendation was submitted, June 6, 1900:

"In this climate an infectious-disease hospital is quite likely to be required at any time, and can not be improvised in a moment. Its requirements are efficiency, isolation, and convenience. The location of the present city hospital is ideal for this purpose, but not available for the moment. The most practicable suggestion as a temporary expedient is to use Santa Elena Battery as an infectious-disease hospital for the command, turning out the Municipal Board of Health Hospital and assigning to it a location at Puerta de Tierra for an infectious-disease hospital for the civil population. This would demand no construction, as the present building would be sufficient for storage purposes, and floored and raftered tents would furnish shelter for the sick. It is so recommended."

As bearing upon the sanitary conditions, it may be recalled that the only changes in the constitution of the command during the year was occasioned by the organization of the Second Battalion, Porto Rico Regiment, United States Volunteer Infantry, numbering 450 officers and men, and the departure of the first squadron of

the Fifth United States Cavalry, March 24, 1900. The strength of the command on June 30, ultimo, was 3,096, against 3,142 on June 30, 1899. The monthly sanitary reports, several of which have been most interesting and exhaustive, and the inspection by the chief surgeon lead to the conclusion that there has been considerable improvement in the immediate sanitary surroundings of the troops, but I am persuaded that there is yet room for improvement. A study of the percentages of sickness at the four largest posts is interesting, but not entirely conclusive. As frequently remarked, the sick report of a command, under average circumstances, depends in large measure upon the zeal and experience of the medical officer.

At the beginning of the month there were remaining under treatment at San Juan, 4.5 per cent; at Ponce, 2.6 per cent; at Mayaguez, 5.2 per cent, and at Cayey, 3.7 per cent (Porto Rico Battalion in camp).

The headquarters and the Third Squadron, Fifth Cavalry, and the First Battalion, Eleventh Infantry, are at this writing under orders to proceed to the United States, together with 2 medical officers, 3 acting assistant surgeons, 5 acting hospital stewards, and 25 privates, hospital corps; 1 signal officer, 6 noncommissioned officers, and 9 privates of the Signal Corps.

At the beginning of July, 1899, there were remaining sick from the previous year, at San Juan, 10 per cent; at Ponce, 6.8 per cent; at Mayaguez, 8 per cent, and at Cayey, 11.3 per cent (M Troop, Fifth Cavalry, in barracks).

Attention is invited to the interesting report of First Lieut. B. K. Ashford, Medical Department, United States Army, some time surgeon at Ponce, for the month of September, 1899, in which reasons are given for the abolition of the post. Certainly the present very satisfactory condition of the health of the command would be an argument against such as a sanitary necessity. But, as a practical fact, at this moment the community of Ponce is living over a powder mill. There is no epidemic, except of poverty and starvation, but the death rate, which last week was at the ratio of 123 per thousand per annum, would indicate a condition of affairs ripe for anything. While the annual rate for 1899, 42 per thousand, is not evidence of a health resort, the rate for the entire island was 41.

The War Department has a very valuable plant at Ponce, which could doubtless be disposed of for more than enough to construct a modern and perfectly appointed suburban military post.

A considerable amount of constructional work has been done on barracks and hospitals during the year, much of it entailed by the hurricane, and it may be stated that all of the permanent posts are in fairly good condition.

Attention is invited to the series of interesting sanitary reports from the surgeon of the post of San Juan, covering the sanitary conditions and requirements of that station. So far as observable, the least comfortable, relatively, of the military people are the officers and noncommissioned staff. They should at least be made as comfortable here as at home.

The drainage and sewerage remains about the same as last year, when it was stated that such was "practically nonexistent." The barracks at San Juan alone have sewer connections.

The water supply is usually adequate in quantity, but the quality is always suspicious. Every barrack should be supplied with some efficient and convenient means of sterilizing water, for all the water in Porto Rico must be regarded as bad. In this connection attention is invited to the reports of First Lieutenants Ashford and Russel, Medical Department, United States Army, on intestinal parasites in Porto Rico, the logical deduction from which is that a very large percentage of the natives of the island entertain the most objectionable of these entozoa. Considering their habits, this is not surprising, nor is it surprising that drinking water here must be sterilized to be safe.

Ice is very essential to our people in the Tropics. An excellent plant has finally been established in San Juan which produces 3 tons of ice and 500 gallons of distilled water daily. The plant at Ponce is not efficient, and is very expensive in connection with the supply of water to the hospital there. As ice is now readily obtainable from commercial sources in Ponce, I have recommended that the ice machine there be moved to Cayey, provided the latter is to become a permanent station.

The monthly reports indicate that the food is satisfactory in all respects. I have not heard of any post gardens being started, but the advantages of such are apparent. The practical truth of the matter is, we do not yet feel at home here and are thinking much more of getting away than putting our establishment in order for a long and comfortable sojourn.

Clothing is reported in ample supply, but objection is made to the "war" khaki, which is bedecked with various colors and when washed becomes all colors. It has been suggested that the several thousand suits of this in stock might be distributed

to the natives here, who now wear only their skins. But this is hardly a satisfactory disposition of a United States Army uniform.

The habits of the men as to intoxication are reported as improving. Court-martial has eliminated the worst drunkards who managed to elude the vigilance of the recruiting officer; but rum is so universal and cheap and the demands that the Tropics make upon northern vitality are so pressing that a stimulant of some kind is necessary and the most convenient one will usually be taken. Two hundred and twenty-eight cases of diseases of the nervous system occurred last year.

I wish I might be able to say that these records indicate a decline in venery, but unfortunately such is not the case, for of all diseases venereal alone shows an absolute increase, a ratio of 506 per thousand. Some of the worst of these cases were discharged on surgeon's certificate of disability, with the recommendation from this office that the discharge be made "without honor." Several reasons led us to this recommendation. (1) It was believed necessary to take stringent measures to control the spread of a disease which was not only threatening the efficiency of the service, but was threatening to involve our people at home to-day and far into the future. (2) It was believed that some were so misguided that they actually sought the disease as a means by which they might obtain discharge from service which had become irksome to them. (3) It was thought that the Government had some equity in the matter and should not be called upon to lose any more of its investment in the particular individual than was absolutely necessary. These views were not accepted, as shown by the following correspondence:

WAR DEPARTMENT,
Washington, D. C., May 26, 1900.

THE COMMANDING GENERAL, DEPARTMENT OF PORTO RICO,
San Juan, P. R.

SIR: By direction of the Assistant Secretary of War, I have the honor to communicate to you herewith the opinion of the Surgeon-General of the Army, dated May 12, 1900, which has been concurred in by the Assistant Secretary of War:

"In my opinion discharge for venereal diseases should not be a discharge 'without honor' and there should be no objection to the reenlistment of a man discharged for such disease, if he has entirely recovered. If it is considered in the interest of the service to discharge a man who has contracted venereal disease rather than to retain him in service until he has recovered under proper treatment, he should be given the usual discharge upon certificate of disability, which certificate should set forth the fact that the disease was not contracted in the line of duty, but there is not authority for indorsing the nature of the disease upon the soldier's discharge.

"If enlisted men are discharged 'without honor' for contracting venereal diseases, officers should be dismissed the service if they meet with a like misfortune."

Very respectfully,

THOMAS WARD,
Acting Assistant Adjutant-General.

The present condition of the permanent hospitals is as follows:

The hospital at San Juan, which ceased to be a general hospital December 31, 1899, is in excellent condition. Expended in repairs during the year, alterations and plumbing, $2,884.10. The capacity of this building is far beyond present and prospective demands. To concentrate the work and material of the medical depot, it is proposed to turn over the present hospital corps squad room (6,000 square feet) to be used by the supply depot. The considerable reduction of the hospital corps detachment on duty at this hospital will permit this use of the space, and thus allow both the hospital and depot to be brought, if necessary, under the control of one officer.

The hospital at Ponce is in admirable condition and is, as it always has been, a credit to the department. Expended in repairs during the year $730.16.

The hospital at Mayaguez, which, as above stated, was wrecked by the hurricane, is now undergoing repairs, at a cost of $5,000. During the intervening period a very comfortable private building has been used, at a rental of $75 monthly. The delay in the repair of the hospital was due to various causes, chief among which was the determination of the title to the property.

The hospital at Aibonito has been repaired on the old lines, at a cost of $550. It is comfortable and adequate to any demand likely to be made upon it.

No permanent construction has yet been made at Cayey, but an excellent temporary hospital has been established in half of the barracks building (for dispensary, wards, etc.). A frame building was constructed on the foundation of the old hospital, to be used for messroom, kitchen, and storeroom, at a cost of $1,783.04.

Very satisfactory temporary hospitals in private buildings are maintained at Humacao, Aguadilla, and Adjuntas, the last named the least so.

Four temporary hospitals, Arecibo, Lares, Manati, and San German, have been abandoned.

Furniture, appliances, and supplies of all kinds are ample.

The personnel of the medical department at the date of this report consists of—

	Medical officers, U. S. A.	Medical officers, U. S. V.	Acting assistant surgeons	Hospital stewards, U. S. A.	Hospital stewards, Porto Rican Regiment (native troops)	Acting hospital stewards, Hospital Corps, U. S. A.	Privates, Hospital Corps, U. S. A.	Contract surgeons (female)
July 25, 1900:								
Present	7	2	10	4	4	15	81	.
Under orders	2	.....	9	1	.	5	25	.
Remaining	5	2	7	3	2	10	56	.
Strength July 25, 1899	12	.....	19	8	.....	20	124	8

No contract (female) nurses have been on duty in the department this year (1900).

The reduction of the medical strength to little more than 3 per cent of the command is considered to be the lowest justifiable limit, though considerably in excess of the regulation allowance. I hope the time has come when the authorities will realize that the sanitary soldier is intended to meet just the circumstances that any other soldier should. He is not only for present conditions but future contingencies, and there should be about as many of him as these contingencies are likely to require. The present reduction was made to meet the emergency of foreign service.

The instruction during the year continued on the lines laid down in the circulars of December 28, 1898, which requires four hours weekly to be devoted to this purpose. The class standing is reported monthly in the return of the Hospital Corps, and the good result of the instruction is shown by the fact, as stated in a letter from the Surgeon-General's Office, that the proportion of acting hospital stewards was higher in this department than in any other.

The examinations are quite up to the standard of antebellum days.

Attention is respectfully invited to the report of the officer in charge of the medical supply depot, San Juan, hereto attached. A very large amount of property has been inspected and condemned. This is due to several causes: (1) A great deal of property was destroyed by the hurricane, and (2) a considerable amount of worn-out property had accumulated and awaited the action of the inspector.

In spite of the vicissitudes of war and various other happenings in Porto Rico, there still remains on hand a large amount of field supplies, much of which has been in use. The supply officer has had each of this as was worth it put in order, but while it might be exceedingly useful here, I question whether it would be worth sending elsewhere. Many special requisitions have been received from the smaller posts, so many indeed that a circular was issued calling attention to paragraph 68, Manual Medical Department, 1899.

The supplies have been ample and adequate in all respects.

The demands made upon the medical department in relation to the civil work were quite commensurate with that of the rest of the military body in Porto Rico. Everywhere the requirements of a starving race thrust themselves upon us, and I am happy to say that everywhere my officers and men willingly accepted the added burden. On the day of the hurricane Captain Wells, at the height of the storm, went to the rescue of those caught in the wreck of the Santa Rosa Hospital, San Juan, and personally supervised their transfer to the military hospital. Lieutenant Ashford, at Ponce, opened his hospital to the homeless sick there, and as soon as possible after the storm erected a tent hospital which for months furnished everything necessary to the best care of hundreds of sick who otherwise must have gone without care. Lieutenant Russel, at Humacao, afterwards alcalde of that municipality, rendered signal service, as did Lieutenant Truby at Mayaguez, while Drs. Eberle, McConathy, Williams, and Cutliffe were unsparing of themselves in their efforts to relieve not only their own sick but those of the suffering communities about them.

The organization and general supervision of the relief work in Porto Rico fell to the writer and has been made the subject of an exhaustive report, but I can not fail

to take advantage of this opportunity to invite the particular attention of the department commander to the very important part taken by all the medical personnel in the effort to keep 100,000 human beings alive.

The reestablishment of the general sanitary organization of the island, the formulating of regulations, the licensing of the medical personnel, the organizing of a chemical laboratory, vaccine station, etc., indeed all the functions of a State board of health, which had been in abeyance since before the invasion, added to the already heavy burdens of the medical department, but were made cheerfully and zealously.

The organization of the insular charity institutions and their supervision also fell to our share, until it seemed that in no day were there hours enough for the work.

In connection with these various undertakings I would invite special attention to the valuable services of the following-named gentlemen, who have not heretofore been mentioned in this report: Maj. P. R. Egan, surgeon, United States Army, who during most of the time the relief work was being carried on was secretary and disbursing officer, and who purchased much and distributed all of the medical supplies used in this work; Maj. George G. Groff, surgeon, United States Volunteers, who was secretary of the superior board of health, was largely instrumental in its organization, and Dr. Harold W. Cowper, acting assistant surgeon, who at different times was the secretary of both the superior board of health and the board of charities, Porto Rico, in both of which his services were marked by zeal and intelligence.

With the completion of this report my official connection of nearly two years with this department as its chief surgeon and of more than a year with the present department commander ceases. I may therefore be pardoned in expressing my appreciation of the unfailing support which he has extended to me and the kindly courtesy which has marked all our relations.

EXTRACT FROM THE REPORT OF MAJOR P. R. EAGAN, SURGEON, UNITED STATES ARMY, MEDICAL SUPPLY OFFICER, DEPARTMENT OF PORTO RICO.

Experience in a tropical clime has shown that the following articles should receive special attention in order to prevent their deterioration:

1. Chloral, potassa, and deliquescent salts should be placed in glass-stoppered bottles.

2. Articles of iron, such as garden trowels, gridirons, etc., should be galvanized.

3. Articles of tin, such as colanders, milk pails and buckets, pans (milk, dish, and waffle), Arnold sterilizers, etc., should be made of agate ware. Iron and tin ware is soon rusted through, and the life of such articles in this climate is very short.

4. All surgical instruments should be well protected by the application of a film of vaseline by the manufacturer. Case and thick paper alone are not sufficient protection here.

5. Saws, hand and butcher, and the contents of tool chests should be well protected by vaseline and wrapped in paper.

6. All medical books should be wrapped in thick manila paper, with the title outside. Two weeks here is sufficient time to mold the covers unless so protected.

7. Tourniquets, rubber, and Martin's bandages should be protected by talcum when placed in their packages.

8. No wax should be used to seal bottles of liquids; capping is cleaner and better.

9. The green soap in the surgical chests should be inclosed in a strong screw-capped vessel. At present it escapes and fouls everything in its compartment.

DISPOSAL OF EXCRETA.

In my last annual report is given the description of a trough system for the collection of the excreta of camps with an odorless excavating apparatus for their removal. This system was recommended by a board of medical officers to whom I referred the subject. Their report was forwarded to the Adjutant-General of the Army and the details of the subject were published in General Orders, No. 170, September 26, 1899. In their report the board stated that "methods of incineration of fæces have been and are being investigated, but our practical examination has not been sufficiently extensive to warrant us in recommending any of them." In a second report the board stated that it had been able to examine the practical operation of three crematories which had been erected for trial at Washington Barracks, D. C.

First. The combined camp crematory for excreta and garbage designed and submitted by Frederick P. Smith, C. E. This consists of a series of hoppers arranged in a circle about a central furnace. The materials to be destroyed are received on flat plates having such an incline that the liquid parts flow toward the central fire and are subjected to a constant drying. The solid parts are from time to time pushed toward the edge of the fire, and when dried can at any time be raked into the grate and burned. A large evaporating pan is placed above the fire for the reception of garbage, which, when dried sufficiently, is tilted into the fire and burned. Draft and ventilation are secured by a pipe having a height of about 40 feet. This crematory was reported to have accomplished all that its inventor claimed for it. Its weight, however, renders it unsuitable for troops on field service. A 14-hopper crematory for two companies would weigh 7,000 pounds.

Second. A crematory submitted by the Albany Sanitation Company, of Albany, N. Y. This consisted of a furnace and 7 closets. Each closet section is a cylindrical tube of one-fourth inch cast iron 20 inches in diameter, and weighing 150 pounds. Rising from each section is a cast-iron hopper, provided with suitable seat and cover. The separate closet sections are provided with flanges, by means of which the several sections are securely bolted together, thus forming a continuous iron tube, connected at one end with the furnace. Excreta are received into this hollow iron tube. A galvanized-iron pipe 14 inches in diameter is provided for the purpose of bringing a current of warm air from the furnace, and thence conducting it to the distal end of the excreta tube, from which point it is drawn over the surface of the excreta. This serves both for the purpose of drying the excreta and for the ventilation of the closet. A urinal is provided, from which the urine is conducted, by means of a 3-inch iron pipe, to a pit beneath the furnace, where it is subject to constant evaporation. The furnace is furnished with a smokestack 16 inches in diameter, rising to a height of about 35 feet.

This crematory accomplished in ventilation and freedom from odor all that was claimed for it by the Sanitation Company, but it failed to effect the thorough desiccation of the excreta preparatory to incineration. Moreover, the weight and unwieldiness of its sections render it unsuitable for portability.

Third. A crematory submitted by the International Household Garbage and Excrement Crematory Company, of Buffalo, N. Y. This consists of a steel jacket lined with asbestus within and provided with a sheet-iron covering without. The top and bottom of this jacket consist of cast iron. The excreta are received into a cast-iron pot, having a capacity of 7 gallons, and which revolves on a horizontal axle. A suitable grate, with ash pit, is provided beneath the pot. An opening of proper dimensions, with seat and cover, is provided in the cast-iron top of the jacket. Ventilation is brought about by means of a 6-inch stovepipe flue rising to a height of 12 feet. When desired to destroy the contents of the pot, the wooden seat and cover are removed, the opening closed with a galvanized-iron cover provided for that purpose, and a fire started on the grate below. The board found that the ventilation was not such as to remove all offensive odors when the cover was lifted and that during incineration pungent and disagreeable odors were evolved.

The closing paragraph of the report of the board is as follows:

In the opinion of the board, none of those mentioned above meet all the conditions of troops in the field as well or as economically as the apparatus recommended by this board in its report of December 28, 1898. We believe that the apparatus therein described is much easier of construction, far more readily transportable, and capable of effecting the same results in an equally satisfactory manner as to the disposal of excreta. For large hospitals or permanent camps the Smith crematory, if intelligently managed, will suffice for the destruction of both excreta and garbage, and for such purposes we believe that it may be recommended.

Several of the Smith crematories were sent to Cuba for practical trial. They were used at Guanajay and Pinar del Rio. At neither of these places did they give satisfaction. Major Havard, chief surgeon of the division, August 23, 1900, urged the speedy substitution of some other system for the disposal of excreta and garbage at these two posts. The chief defect of the Smith crematory was an offensive odor, due to imperfect combustion. He believed that if this were remedied the system would be valuable.

FOOD.

The subsistence allowance of 40 cents per day has proved ample at all posts to give the sick and wounded the special diet which they require.

Since the occupation of Cuba, Porto Rico, and the Philippines by our troops much has been said and written on the desirability of altering the ration of the United States Army to suit it for the needs of the system in tropical climates. At first the claim was freely made that the ration should contain less meat, less fat, and more rice than under existing laws. This agitation subsided when volunteer medical officers came to understand that the diet of the soldier may be varied by the use of many articles that are not mentioned as parts of the daily ration; that with the commuted savings of the ration articles may be purchased from the Subsistence Department or from outside sources with which to vary the diet, and that, as stated by Major Havard in his report for the division of Cuba (see page 174), the diet of the soldier is what the company commander and his first sergeant and cook may choose to make it, the materials being amply provided by the official ration. Under present laws and regulations the soldier may have any variation of his diet within certain money value limits which his officers consider necessary for his well-being. His ration is fixed by law, but his diet depends on the intelligent supervision of company officers and the ability of company cooks.

Besides this, a further experience in the Philippines has shown that though it is undoubtedly true that while leading quiet lives men eat less in a tropical climate than in a temperate or cold climate, and particularly of meat or fatty substances, our soldiers during the active operations of last year have shown no marked tendency to lessen the quantity of fresh meat eaten. Exhausting labors and fatigues with corresponding wear and tear of the muscular system require a liberal meat issue, which the soldier uses with satisfaction and advantage. According to the chief surgeon Department of Northern Luzon, the fresh beef and mutton sent to the Philippines came as a rule from Australia, and was issued in excellent condition to the troops in the interior, hundred of miles from Manila.

During the active service of the troops in the Philippines a scarcity of fresh beef and potatoes was at one time reported from some of the commands, particularly from outlying posts in Nueva Vizcaya, which

were reached with difficulty. With these exceptions and that of a recently received report from Maj. Jefferson R. Kean, surgeon, United States Volunteers, chief surgeon Department of Havana and Pinar del Rio, medical officers have expressed entire satisfaction with the present ration and the earnest efforts of the Subsistence Department to supply their commands.

Major Kean refers in his report to what he regards as certain shortcomings in the army ration, particularly as regards its use in a tropical country. He premises that a tropical dietary, as compared with one suited to a colder climate, should have less fat and more carbohydrates, less stimulating proteids in the form of meat, a greater variety of diet both of meats and of carbohydrates in the form of fresh vegetables and fruits, and, lastly, a fairly liberal supply of ice. His argument for the substitution of carbohydrates for fats is that the digestion is weakened in hot climates and the liver is inclined to torpidity, while ingested fats are prone to split up into butyric, caproic, and other irritating acids, which the diminished secretion of the liver is unable to neutralize. As intestinal digestion can not proceed in the presence of acidity, the condition known as biliousness is established, with putrefaction of the intestinal contents and the production of various harmful alkaloidal substances. A catarrhal inflammation of the bowel results, with diarrhea, which is at first of advantage in eliminating the harmful substances, but which under the continued irritation of unsuitable diet is liable to continue and become aggravated. As to a lessened use of meat, he cites the dietary customs of the inhabitants of hot climates, who get their proteids less from meat than from the leguminosæ. The appetite is lessened by long and continued heat and becomes capricious. It craves variety, especially in vegetables and fruits, and these he claims can not be had on the basis of our present ration. The need of ice to furnish a cool drinking water and to preserve the perishable constituents of the ration is regarded as obvious.

The ration fails in his opinion to provide for these requirements, for although there are several alternative issues authorized in Army Regulations, 1253, the choice of them does not seem to be with the soldier or his captain, and the company savings as now authorized on the fresh-beef and other issues do not suffice to purchase enough of fresh vegetables. He tabulates the savings made by 18 organizations, numbering 1,900 men, at Columbia Barracks, Cuba, from July 1 to December 31, 1899, as showing a per diem of only 1.8 cents per man.

To remedy these defects he suggests certain changes in the ration: That mutton and fish be issued each twice in ten days; that the issue of fresh meat in garrison be ordinarily 12 ounces, the commutation of the remaining 8 ounces of the 20-ounce ration to be paid in cash into the company, troop, hospital, or other mess fund; that commanders of departments, corps, or independent divisions or brigades be empowered, on the recommendation of the chief surgeon, to increase the issue of fresh meat not to exceed 20 ounces when necessary; that the vegetable component of the ration to be issued consist of rice, 2.4 ounces; frijoles, 2.4 ounces, or macaroni, 2 ounces, and fresh vegetables, in proper variety (purchased in the vicinity of the post when practicable), 16 ounces, and that ice, 32 ounces, be added to the ration. In our present ration potatoes are a daily issue, furnishing the bulk of the fresh vegetable allowance. These potatoes have to be transported from the United States. During the spring and summer they become spoiled during the three or more weeks required to get them from the

dealer in New York into the hands of the company cooks in Cuba. Meanwhile sweet potatoes, cabbage, onions, kershaw, pumpkin, squash, beets, turnips, yams, plantains, and bananas can be obtained in abundance in Cuba at almost any season of the year. Major Kean's suggestions provide also that in the field canned tomatoes or other canned or dried vegetables may be issued instead of fresh vegetables or to make up a deficiency in the supply of the latter. If desired by company commanders, a commutation price of 5 cents shall be paid instead of the allowance of fresh vegetables when these can not be supplied by the Subsistence Department in the field. The commutation price for fresh vegetables is intentionally made about double the ordinary market value of the vegetable component because of the difficulty of making purchases cheaply and to the best advantage on field service.

Lastly, it is suggested that when the chief commissary of the command finds it impracticable to supply ice, a commutation of 1 cent per pound should be paid in lieu thereof.

There is no doubt that the more liberal the commuted value of the savings of the ration the better will be the dietary of the soldier. It must be noted, however, that Major Havard, chief surgeon of the division, who surveys the whole field in Cuba, is of the opinion that the ration, under the supervision of intelligent officers, is ample to furnish everything requisite.

Ptomaine poisoning.—Four instances of ptomaine poisoning were reported during the past fiscal year. The transport *City of Rio de Janeiro* left Honolulu, H. I., October 17, 1899, for Manila, P. I., carrying about 700 officers and men of the Thirty-fifth United States Volunteer Infantry, C. W. Fry, acting assistant surgeon, in charge, and Maj. H. O. Perley, surgeon, United States Army, a passenger on board. Five days later 25 cases of gastro-enteritis occurred, the disease being chiefly confined to one company. This outbreak was at the time attributed to the use of canned goods purchased by the men from the commissary stores on board the transport. Under this impression further sale of these was prohibited. Next day, however—that is, on the evening of the 23d and morning of the 24th—289 enlisted men and 2 officers were attacked with abdominal pains, vomiting, diarrhea, headache, muscular prostration, and great thirst. All these symptoms were not manifested equally in every case. In 42 the headache was very severe, and in 18 the diarrhea could not be restrained. Muscular weakness was present in all, and in 35 there was excessive perspiration, with coldness of the skin, cramps of the legs and arms, aching of the joints, great restlessness, and muscular twitchings. In a few of the cases prostration was very great and the pulse feeble. One man died at the end of eight hours. On investigation it was found that all who were sick had eaten of the fresh meat issued to the men on the evening of October 23. The use of this meat was discontinued. No further sickness occurred.

On March 25, 1900, out of a company of 94 men of the Eleventh United States Infantry, forming part of the garrison of San Juan, P. R., 57 were admitted to hospital and 10 became slightly sick, but did not apply for treatment. The symptoms were persistent vomiting, severe cramps in the stomach, purging, great prostration, dilatation of the pupils, headache, clammy perspiration, chilliness, and great thirst. The stomach in each case was washed out by means of the stomach tube. In some cases the stomach was empty, and nothing but water and mucus came away; in others the washings were tinged with bile,

and in others again a moderate amount of food that had been eaten for breakfast was washed out, but in no case was the stomach overdistended or even full. The vomiting was controlled in several instances by the washing out of the stomach, but in many it persisted for several hours afterwards. The prostration was so great that some of the patients fainted before reaching the ward. A large number vomited blood in small clots, in most instances mixed with nothing but mucus, showing that the hemorrhage had not taken place until after the contents of the stomach had been expelled. Purging began in most before the vomiting had ceased, and continued for twelve to fifteen hours. At first the stools were natural, soon watery, afterwards becoming mucus and blood tinged. Cramps in the voluntary muscles were mild in some, but other patients writhed in agony, their sufferings being relieved only after thorough kneading and massage by the hospital attendants. Forty were discharged from hospital on the following morning; the others from day to day until the fifth morning, when all were returned to duty.

A careful study of the food eaten that morning led the surgeon, Capt. George M. Wells, assistant surgeon, United States Army, to refer this general attack to the condensed milk used with the mush furnished for breakfast.

Acting Asst. Surg. L. B. Sandall reported two instances in Company L, Ninth United States Infantry, at Concepcion, P. I., one on March 13, the other on May 13, 1900. Forty-four men were affected in the one case; 28 in the other. All recovered after suffering from vomiting, watery stools, profuse cold perspirations, and cramps in the thighs, legs, and feet. Corn-beef hash was considered to be the cause of the trouble, but the cans when opened appeared to be in perfect condition.

CLOTHING.

The clothing issued by the Quartermaster's Department has given satisfaction to the troops, whether serving in Alaska, in the severe climate of Montana and Dakota, or in the islands in the Tropics. At first, as stated in my last annual report, the unsuitability for use in the Tropics of the clothing worn by the troops on their arrival in the islands was indicated by many medical officers, and many suggestions were submitted. During the past year, however, only a few critical references to clothing are to be found in the sanitary reports. These relate chiefly to stiffness or a want of pliability in the texture and of uniformity in the color of some of the khaki issues. Khaki cloth of the strongest texture is required to withstand the wear and tear of the rough field service experienced by our troops in the Philippines, and this strength of texture is incompatible with a high degree of pliability, particularly while the uniform is new. It is understood that the Quartermaster's Department has made great improvement in the texture and coloring of the field uniform during the past year.

PREVALENCE OF SPECIAL DISEASES.

MEASLES.

In the Army, Regulars and Volunteers, in 1899 there were reported 2,755 cases of measles, with 3 discharges for disability and 37 deaths. These are equivalent to an admission rate of 26.10 and a death rate of 0.35 per thousand of strength. The rate of fatality or percentage of

fatal cases was 1.34, or 1 death in 74.5 cases. The rates of admission and death were higher among troops serving in the United States than among those on foreign service, the admission rate in the home camps and garrisons being 32.61 and the death rate 0.71 per thousand of strength.

In 1898 there were reported 7,389 cases, 7 discharges, and 70 deaths. These are equivalent to an admission rate of 49.98 and a death rate of 0.47 per thousand of strength. The percentage of fatal cases was 0.94, or 1 death in 105.5 cases. During this year also the prevalence was somewhat greater in the United States than among the troops in the islands.

As showing the care given by medical officers to prevent the spread of the infection of this disease, several instances are on record of the successful passage of troops across the Pacific with one or more cases of measles in isolation on the transport. Thus a case occurred on the transport *Pathan*, carrying the Forty-sixth United States Volunteer Infantry en route from San Francisco, Cal., to Manila, P. I., when sixteen days out from her port of departure. The patient was promptly isolated and the disease suppressed.

SCARLET FEVER.

Only 47 cases of scarlet fever were reported as having occurred in the Army, Regulars and Volunteers, in 1898, and 22 in 1899. Seven of these were fatal in the former year; none in the latter.

SMALLPOX.

In 1898 92 cases of smallpox were reported, with 23 deaths, and in 1899 347 cases, with 84 deaths, a total of 439 cases, with 107 deaths, during the two years. Of these cases, 342, with 99 deaths, occurred in the Philippines, the fatal cases constituting 29 per cent of the total number. Seventy-two cases, with 3 deaths, occurred in the United States, the fatal cases constituting only 4.17 per cent of the total number.

That the regular troops were better protected from the infection of smallpox than the volunteers is shown by the relative prevalence of the disease among the troops in the Philippines in 1899, where large mixed commands operated during the whole year in a dangerously infected country. Among a mean strength of 22,922 regulars there occurred 110 cases, of which 23 proved fatal, while among the volunteers, with a mean strength of 16,358, there occurred 157 cases, 55 of which were fatal. The rate of admission per thousand of strength among the regulars was 4.80, among the volunteers 9.60; and while the death rate among the regulars was only 1 per thousand men, among the volunteers this rate was 3.36 per thousand.

Vaccinia.—During the year 1898 6,916 men were taken on sick report as excused from duty on account of vaccinia, and of this number 1 man, belonging to a command stationed in the United States, was discharged for disability. In 1899 6,895 were taken on sick report, and 1 man in the Philippine Islands was reported as having been discharged for disability and 1 in Cuba as having died as a result of the vaccination.

The discharge reported as having taken place in the United States

was that of F. B., private, Company E, Third Missouri, who was admitted into St. Agnes' (civil) Hospital, Philadelphia, Pa., August 29, 1898, suffering from "septicæmia from vaccination." He was reported discharged September 23. The discharge for disability in 1899 from troops in the Philippines really took place in the United States, the man having been left behind sick by his regiment on its departure for service in the Division of the Philippines. Private A. C., Company L, Sixth United States Infantry, was admitted into the post hospital, Fort Sam Houston, Tex., April 7, 1899, with vaccinia, complicated April 17 with axillary abscess. He was discharged June 13, 1899, "on account of septicæmic abscess of left axillary and pectoral regions due to vaccination and resulting in contraction of the fasciæ and muscles, impairing the use of the arm." The death reported from Cuba was that of A. K., private, Third Nebraska, First Division, Seventh Army Corps, who died at Havana, Cuba, 1899, from "tetanus resulting from infection from vaccination."

But besides these cases, which were attributed on the reports directly to vaccination, a careful examination of the history of cases recorded under the headings septicæmia, tetanus, etc., has shown that the operation of vaccination was the starting point in several other cases which had untoward results. These include 1 case of erysipelas ending in recovery; 1 case of discharge on account of the results of vaccination, which case is not included in the tabulation for the year 1899, as the discharge did not take place until the year 1900; 6 fatal cases of septicæmia, 5 of which occurred in a detachment of recruits at Camp Merritt, Cal., and 1 case of death from tetanus.

I. J. J. O'N., private, Company D, Ninth United States Infantry, was taken on sick report at Madison Barracks, N. Y., January 27, 1899, on account of vaccinia. He was returned to duty February 1, but on the report of the transport *Zealandia*, en route to the Philippines, his name again appears as admitted to sick report April 1, 1899, for erysipelas following vaccination. On April 7 he was returned to duty.

H. W. J. J., private, Company E, First United States Infantry, was admitted March 4, 1899, to the post hospital, Pinar del Rio Barracks, Cuba, for vaccinia, and was returned to duty on the 11th, but his name appears again on the reports as admitted March 15 with vaccinia and returned to duty on the 17th. On May 1 he was admitted to the post hospital at Guanajay, Cuba, for neuritis of the left arm from vaccination, and was transferred May 4 to the hospital ship *Missouri* as a case of false anchylosis of the left elbow following infected vaccination. The hospital ship brought him to Fort Wadsworth, N. Y., where, on the records, the remark appears, "This man has had no anchylosis since admission to this hospital, but complains of neuralgic pains in his left arm." On August 25 he was returned to his company, which appears to have been again stationed at Pinar del Rio Barracks, Cuba, for on the report from that post his name appears as admitted to sick report September 27, 1899, on account of "loss of power and sensation, left arm, secondary to severe pus infection at time of vaccination, February, 1899; hand swollen and cold." He was transferred to military hospital No. 1, Havana, Cuba, October 5. Here the record states the cause of admission to have been "loss of power and sensibility in the left arm due to vaccination." He was discharged January 13, 1900, on account of "paralysis of left arm and forearm, the result of vaccination."

III. G. S., private, Company K, First South Dakota, was admitted into regimental hospital June 26, 1898, for vaccinia, and was returned to duty June 28. He was admitted into the field division hospital, Presidio of San Francisco, Cal., July 18, 1898, with synovitis of the right knee, and was discharged on certificate of disability next day on account of chronic synovitis of the left knee joint. He did not leave the hospital, but was taken up on the records July 20 as a discharged soldier with abscess in left axilla following vaccination. The abscess was incised and curetted July 27. Septicæmia was developed August 1, and the patient died August 4 of "septicæmia following axillary abscess."

IV. A. L. H., recruit, Company E, First Colorado, was admitted to the French Hospital (civil), San Francisco, Cal., August 4, 1898, where he died next day; cause of admission, septicæmia following vaccination.

V. J. G. M., private, Company C, First Tennessee, was admitted into regimental hospital with vaccinia July 23, 1898, and returned to duty on the 24th. He was readmitted on the 31st and sent to the division field hospital of the Independent Division of the Eighth Army Corps August 1 with vaccinia complicated with abscess of the left axilla, and on August 6 with septicæmia. He is reported to have died August 16 of "septicæmia following axillary abscess."

VI. E. D., recruit, First Colorado, died August 21, 1898, of septicæmia at San Francisco, Cal. No mention is made of vaccination in the report, but the case is stated by Colonel Forwood, chief surgeon of the Department of California, as one in which the septicæmia was sequent to vaccination.

VII. A. W. S., private, Company E, First Colorado, died August 23, 1898, of "septicæmia" in the French Hospital (civil), San Francisco, Cal. The records show that the death was sequent to vaccination.

VIII. H. F. C., private, Company I, Third Texas, was admitted into the post hospital, Fort McIntosh, Tex., November 30, and died December 3, 1898, from "septic poisoning." This case was sequent to vaccination.

IX. C. R., private, Company A, Twenty-fourth United States Infantry, died of tetanus on the *City of Para*, en route to the Philippine Islands, August 5, 1899. The following report of his case was given by Capt. Charles E. B. Flagg, assistant surgeon, United States Army:

Private C. R., colored, Company A, Twenty-fourth Infantry, from Sunnyside, S. C., was vaccinated, July 17, with glycerinated virus. The arm was scrubbed with green soap and water, then washed with bichloride solution and then with boiled water, preparatory to vaccination. After vaccination a dressing of sterilized gauze was applied and fastened by adhesive plaster. August 3 he reported at sick call, complaining of pain in his neck and stomach; he had been sick all night. He was given a cathartic and directed to report to the doctor if not feeling better in a few hours. August 4 he suffered greatly all night, but no surgeon was called. Assistant Surgeon Greenleaf saw him in the morning and diagnosed tetanus; trismus was marked. The patient was given 24 mgms. of sulphate of morphine hypodermatically and 2 grams of chloral hydrate by rectum at once. He was then put in a cabin on the main deck and kept as quiet as possible. Convulsions increased in frequency until they occurred every two minutes at 11.30 a. m., when he was given 24 mgms. of morphine hypodermatically. At noon he swallowed 45 c. c. of water. At 1 p. m. his temperature was 99.6° F.; he could not swallow. An enema of sulphate of magnesia, glycerine, and water was given and retained. An ineffectual attempt was made to pass the catheter, two strictures being encountered. A hot-water bag was put over the pubes and he urinated spontaneously sometime afterward. At 5 p. m. he was

given 1 gram of chloral, 2 grams of sodium bromide, and 30 c. c. of liquid peptonoids by means of a catheter introduced through the nose into the stomach, the nose being previously cocainized. At 7 p. m. the dose was repeated, malted milk being substituted for the peptonoids. At 9 p. m. the 5 o'clock dose was repeated. Convulsions became more frequent. At 11 p. m. 16 mgms. of morphine were given hypodermically. The bowels moved slightly, seeming to give great relief.

At 1 a. m. August 5 the patient was sleeping. At 2 a. m. temperature 100° F. At 3 a. m. 16 mgms. of morphine were given hypodermatically. At 4 a. m. the patient was sleeping. At 5 a. m. an enema of chloral, bromide, and liquid peptonoids, as above, was given. At 6 a. m. the temperature was 105.2° F., pulse 129, respiration 30, and convulsions severe. At 7 a. m. patient was sleeping. At 8 a. m. temperature 106° F., pulse 108, respiration 30. At 8.30 a. m. temperature 107° F., pulse 108, respiration 30; an ice cap was applied to the head and 16 mgms. of morphine given. At 10 a. m. temperature 107° F., pulse uncountable, respiration 40; convulsions practically continuous. He died August 5, at 11.30 a. m.

The point of vaccination presented a denuded area the size of half a dollar. There was apparently no swelling or injection of the surrounding tissues. The patient was conscious throughout the disease. He complained of great pain in his neck and abdomen. Opisthotonos was marked. The temperature which at death was 107.4° F., was 108° half an hour afterwards.

The five deaths which occurred in August, 1898, at San Francisco, Cal., indicate the use of a contaminated virus, such as gave rise during the civil war to many instances of serious results following inoculation with matter from crusts or scabs. The haste with which the volunteer regiments were aggregated at Camp Merritt, Cal., and subsequently embarked for Manila accounts for the fact that none of the regimental surgeons of the regiments in which the fatal cases occurred made special investigation into the cause of the untoward results which followed their vaccinations.

The number of men vaccinated is not known, but probably all the accepted recruits for the Regular Army—54,896 in 1898 and 47,899 in 1899—together with 250,000 United States and State Volunteers, were vaccinated or revaccinated in accordance with regulations. As vaccination on the arm often renders it inconvenient for a man to handle his musket at drill, most of the reported cases of vaccinia were, no doubt, excused from duty on account of slight inflammatory action at the vaccinated spot. The number taken on sick report in 1898 represented 46.80 per thousand of strength; in 1899, 65.33, as compared with 28.29 in the Regular Army during the year of peace, 1897, and with 34.57, the mean annual rate of admission during the previous decade.

In many instances, particularly in the Division of the Philippines, vaccination had to be repeated several times on account of the inertness of the vaccine. Lymph sent from San Francisco, Cal., lost its activity during the long voyage. Ultimately fresh vaccine was successfully produced by the board of health of Manila, and the troops in the Division of the Philippines became fairly well protected from smallpox. Lymph was supplied by this board for the vaccination of the population of many of the garrisoned towns with the result of markedly lessening the prevalence of smallpox. Major Edie, president of the Manila board, has stated that the result of the work of vaccination in Manila is shown by the records of the city board of health. For the nine months from October, 1899, to July, 1900, there were 7 deaths from smallpox in the city, whereas in the one month of March, 1899, prior to the systematic use of vaccination, there were 75 deaths from this disease.

On April 1, 1900, a vaccine farm was established at Iloilo, Panay, from which virus is supplied to all parts of the Visayas, both for the vaccination of troops and of the natives. The virus from this farm has been more effective in these southern islands than that from the board of health of Manila, as it is delivered and used without the delay incident to transportation from a distance.

The inefficiency of vaccine lymph which has been kept for some time has been repeatedly noted by our medical officers. The following, by Capt. Charles E. Woodruff, assistant surgeon, United States Army, Fort Riley, Kans., August 19, 1900, is to the point:

In compliance with your general instructions to report upon the character of the vaccine lymph supplied, I have the honor to make the following report of our experiences with vaccination at this post during the present year, as it seems from the facts mentioned below that quite a large percentage of vaccinations as ordinarily made, perhaps 25 per cent, are worthless, and that from 5 to 10 per cent of the soldiers leave for foreign service unprotected.

On account of the wide spread of smallpox last winter in this part of the country, every one who had not been recently successfully vaccinated was revaccinated. In this work I found the usual state of affairs which I have found in other army posts, namely, a large per cent of our vaccinations were successful in spite of repeated unsuccessful attempts in recent years. As small squads of recruits were coming in at all times, their vaccinations were investigated, and all cases unsuccessful elsewhere were tried over again here. Such a large per cent of these cases were successful here that it seems almost to be a rule that an unsuccessful vaccination in a recruit at the recruiting station, instead of showing immunity to variola, is far more apt to mean that the lymph used was inert. In a few squads not a single man was found protected, though all had been operated upon at the recruiting station. In a squad recently arrived from another post we thought that 22 of the 24 should be revaccinated, and we got 11 good results; 3 of these had never been successfully vaccinated in their lives and in 1 it had been tried five times unsuccessfully. Organizations seem to be in just as bad a condition. In a battery which arrived here in the spring I found 39 who apparently needed vaccination, and we got 31 good results. In these 31 there were 10 who had never been successfully vaccinated, and some of these said that they had never been vaccinated at all, even at enlistment, and all these men were traveling through a country in which an epidemic was raging.

In January I vaccinated on one day 22 children with glycerinated lymph 8 weeks old. Though the tubes had been kept in a cool, dark place and had not been exposed to heat, light, nor cold, the lymph was absolutely inert, as not a case was successful, though more than two-thirds of the cases were primary vaccinations. These 22 were again vaccinated with fresh lymph, and 20 were successful. This shows that glycerinated lymph will not remain potent as long as we were first informed that it would. As a few cases of soldiers unsuccessfully vaccinated with lymph on hand three or four weeks were subsequently successful with fresh lymph, we have adopted a rule to make frequent requisitions for small amounts, and to keep on revaccinating recruits until it is successful, unless a good scar shows evidence of being less than ten years old, when we cease after two unsuccessful trials. So far we have made over 1,500 vaccinations and have found but one man who had never been successfully vaccinated in his life and in whom we have failed after repeated trials, which may, perhaps, be one of those rare cases of immunity acquired prenatally.

In regard to bacterial infections the lymph is excellent. The great majority of the successful cases are nearly perfect. In only a few do we get inflamed swollen arms, indicative of other infections, and in none have we had pus formation. In the very few in which there has been sloughing and the formation of a large ulcer, there is some evidence that the infection was due to interference with the arm and did not come from the lymph

The satisfactory results produced by the general vaccination of the natives in the district of Holguin, Cuba; in Porto Rico (see my last annual report, pp. 191, 245, and 246), and in the Philippines, in suppressing the ravages of smallpox, must be regarded as one, and not the least, of the benefits brought by our occupation to the natives of these islands.

BUBONIC PLAGUE.

During the past year bubonic plague, the black death of the Fourteenth Century, has attracted the attention of medical men and caused much anxiety to the public by its invasion of the Western Hemisphere and of the Pacific Islands, which now form part of the territory for the government of which the United States stands responsible before the world. This disease has a history which extends back into remote antiquity. Its ravages in Europe in the middle ages are matters of history, but with the advance of sanitary knowledge in the eighteenth and nineteenth centuries this deadly disease lost its hold upon what may be regarded as the civilized communities of the world. An outbreak occurred occasionally in certain localities into which the infection was introduced, as in Marseilles, in 1720, where a severe epidemic occurred in which the mortality was estimated as being between 40,000 and 60,000. Other local epidemics occurred subsequently to this date. Thus in 1771 nearly one-fourth of the population of Moscow was destroyed by the disease; but on the whole the disease receded from Europe until it found a resting place on the Volga, in southeastern European Russia, with its headquarters farther east in Asia, extending into the Chinese dominions. It seemed as if modern sanitary conditions had put an end to the ravages of the plague, as they had taken the deadly sting from typhus fever and repressed the propagation of cholera. Nevertheless a recrudescence of the disease occurred in 1894 which alarmed the whole of the civilized world. The last appearance of oriental plague in Europe, until this recent recrudescence, was an outbreak on the banks of the Volga in 1878–79. The disease had previously prevailed in a mild form in the vicinity of Astrakhan, and was probably introduced from that locality. An interesting fact in connection with this epidemic is that in Astrakhan the disease was so mild that no death occurred, and that the earlier cases on the right bank of the Volga were of the same mild form, but that the disease there increased rapidly in severity and soon became so malignant that scarcely any of those attacked recovered. This is to some extent the history of epidemics elsewhere, and not only of plague, but of other infectious diseases, such as typhus fever, cholera, and yellow fever. In all of these diseases the outset of an epidemic may be characterized by cases so mild in character that they are not recognized, and during the progress of the epidemic many such cases may continue to occur. These cases are evidently especially dangerous as regards the propagation of the disease, for when they are not recognized no restriction is placed upon infected individuals, although they may be sowing the the germs broadcast.

The termination of an epidemic in the presanitary period depended to a considerable extent upon the fact that those who suffered a mild attack acquired thereby an immunity, and that when the more susceptible individuals in a community had succumbed to the prevailing epidemic there was a necessary termination of the epidemic for want of material. This is illustrated in such cities as Havana and Rio Janeiro, where yellow fever is an endemic disease. The natives of these cities have an immunity which probably results from their having suffered a mild attack during childhood, and the epidemic prevalence of the disease depends upon the presence of "unacclimated" strangers.

The disease indeed seemed to be almost a thing of the past and no longer gave any uneasiness in the countries of Europe which had formerly suffered from its ravages, when in February, 1894, it made its appearance in the city of Canton, China, and three months later in Hongkong. The disease is known to have been epidemic in the province of Yunnan, which is about 900 miles distant from Canton, since the year 1873, but it attracted little attention until the lives of Europeans living in the city of Hongkong were threatened by the outbreak of an epidemic among the Chinese residents of that place. Many thousands of deaths occurred in Canton during the three months which elapsed after its introduction to that city before it effected a lodgment in Hongkong.

Fortunately this outbreak gave the opportunity for competent bacteriologists to make scientific investigations relating to the specific cause of this scourge of the human race and to the demonstration that it is due to a minute bacillus. The discovery was first made by the Japanese bacteriologist Kitasato, who had received his training in the laboratory of the famous Prof. Robert Koch, of Berlin. This discovery was made in the month of June, 1894, in one of the hospitals established by the English officials in Hongkong. About the same time the discovery was made, independently, by the French bacteriologist Yersin. From this time the study of plague has been established upon a scientific basis, and very material additions have been made to our knowledge with reference to the prevention and treatment of the disease. We have learned that certain of the lower animals, including rats and mice, are very susceptible to infection, and that they play an important part in the propagation of the disease; also that the germs are found not only in the blood and in pus from suppurating buboes, but also in the discharges from the bowels of infected individuals. This being the case, it can readily be seen how important a strict sanitary police is in arresting the spread of an epidemic. As in other filth diseases in which the germ is present in the excreta of the sick, insects, and especially fleas and house flies, probably play an important part in the spread of the disease.

From Hongkong the infection was carried to Bombay, in which in the last week of December, 1896, the mortality was 1,384. In January, 1897, the mortality was nearly 5,000, and in February 4,600, although by this time the population of the city had been diminished by about one-half by the flight of its inhabitants. In March there was a noteworthy reduction in the number of deaths, and this continued during April and May, and in August the disease had almost disappeared, but early in 1898 there was a recrudescence of the epidemic, and in November of that year the total mortality had reached 26,423. The disease extended throughout the Bombay Presidency, following, as a rule, the lines of the railway. In this way it reached Surat and Buroda, on the northern line, Poona, Carad, and Miraj, on the southern, Calcutta and Nasik on the eastern, and Scholapur and Hyderabad upon the southeastern. The total mortality in the Presidency of Bombay up to November 11, 1899, was 164,083.

Thence the plague was introduced into Alexandria, in Egypt, and in August, 1899, it made its appearance in Oporto, Portugal. In October, following, it crossed the Atlantic and invaded American shores at Santos, Brazil. Cases of plague from Santos were received

at the New York quarantine station and there stopped. In December, 1899, the disease was discovered in Honolulu, H. I., apparently introduced from the Orient, but it was confined to the Chinese quarter, and the vigorous repressive measures instituted by the local authorities prevented its general spread. No case occurred among the military population on the island.

Reports were received also concerning the presence of the disease in the Chinese quarters of San Francisco, Cal., but the energetic action of the health office of the city suppressed the infection.

Ultimately also in December, 1899, plague appeared in Manila. Two cases ending fatally occurring in the same house were reported as typhoid fever; a third case seen during life was recognized as plague. Other cases occurred in the same neighborhood. A house to house inspection was started at once. One death occurred in December, 1899, 11 in January, 1900, 35 in February, 49 in March, 44 in April, 17 in May, and 11 in June, while during each of these months from 40 to 80 Chinese died from causes unknown, they having been without medical attendance. The cases of plague reported numbered 225, of which only 58 recovered.

Only 1 American died of the disease, an employee of the quartermaster's department. His case was reported from military hospita No. 3, on May 20. He died next day at the pest hospital. Ward E, of hospital No. 3, in which the case was discovered, is 92 by 34 feet. It contains 55 beds, of which 53 were occupied at the time. It is elevated 3 feet above the ground, and has about 57 square feet and 800 cubic feet of air space per patient. The ventilation is perfect, as the broad verandas, which surround the ward, permit the 14 windows to be always open. The ward has no direct communication with any other, and its basement is well ventilated. It was not considered necessary to subject the whole of hospital No. 3 to quarantine; but the following circular was issued by Capt. John S. Kulp, assistant surgeon United States Army, commanding the hospital:

All passes from this hospital are suspended until further notice.

Natives who are not employees will not be permitted to pass the sentries.

E ward is hereby declared quarantined, and all persons are forbidden to hold communication with its occupants.

No officer, soldier, or civilian will enter the hospital without the authorization of the officer of the day.

A strict quarantine was established in regard to the infected ward, every man being personally instructed in his duties, the main provisions of which were included in the following orders:

SPECIAL ORDERS No. 68.

1. Ward E, its personnel, and its contents are hereby declared in quarantine.

2. No person, except the ward surgeon, will be permitted either ingress or egress. There will be a sentry posted at either door to enforce this order, and two men will be detailed as intermediate food and refuse carriers.

3. All supplies will be brought to a table (outside the south door), placed thereon, and left there. They will be taken from there to the doorsteps by the two intermediate carriers and left there. They will then be taken inside the ward by the men therein. *No person will go within 20 feet of the intermediate carriers, or the inmates of the ward.*

4. Soiled linen will be placed in a 1:100 trikresol solution, and after four hours removed from the ward. Food containers will be set outside as soon as emptied, and will be scalded out by the kitchen force as soon as received. Stools and urine will

be disinfected by dry earth and trikresol in the ward rear, and all garbage properly disinfected by trikresol or lime before being removed.

5. The ward storeroom will be closed until further orders.

6. No dishes, furniture, nor reading matter will be removed from the ward.

7. The floor of the ward will be well mopped daily with a 1:100 solution of trikresol, and each patient will be given a daily sponge bath, using 1:4000 bichloride for that purpose. The ward master will keep a check of these baths.

8. Under no circumstances will natives or pet animals be admitted to the ward or allowed near it.

SPECIAL ORDERS No. 69.

1. The enlisted men of this detachment will bathe in bathroom No. 2 daily, so long as the present quarantine exists. Each man will bathe at the most convenient time, and will report thereafter to the bath steward for check.

2. Ward masters (except of E ward) will provide the bath steward with a daily check-list of such of their convalescents as are able to use bathroom No. 1. This list will be checked and returned. All patients unable to bathe in the bathroom will receive a daily bath in their wards.

3. Ward surgeons will impress upon their subordinates the necessity of absolute cleanliness of person and surroundings. All soiled linen will be immersed in 1:100 trikresol in the linen room for four hours before being turned over to the laundry.

It will be observed that no person was permitted entrance to or egress from the ward. The "intermediate carriers" were themselves isolated separately from the inmates. All received explicit instructions as to frequent hand and face washing, especially before eating, and the rationale of the whole quarantine was carefully explained.

The report of Acting Asst. Surg. Lester W. Lord, in charge of the ward at this time, was as follows:

I have the honor to report concerning the recent quarantine of ward E. Upon taking charge of the ward on May 20, after the establishment of the quarantine, all orders were carefully explained to its inmates. Since then all occupants have taken a daily sponge bath of 1:4000 bichloride; all soiled linen has been placed in a 1 per cent solution of trikresol for four hours before its removal; the floors have been mopped daily with the same solution; and excretions disinfected with pure trikresol, covered with dry earth and lime, and then removed. The guards placed at the doors allowed none to approach within 20 feet, save the intermediate carriers, whose office was to bring the supplies to the doorsteps, and to remove the waste.

On May 21 and 22 all inmates received a subcutaneous gluteal injection of plague prophylactic. Twenty-one of these received 1 c. c. each of the marine-hospital product, and the remainder 5 c. c. each of the Hongkong preparation. Very little inconvenience was experienced, although in a few cases there was a slight rise of temperature and a little soreness at the site of the inoculation. Both passed away in from twelve to twenty-four hours. No puncture abscesses occurred.

On the 23d two suspected cases were sent to the plague hospital, but were subsequently discharged as noninfected. Their mattresses were burned, the bed frames washed in 1:500 bichloride, and their personal effects wrapped in cloths moistened with the same solution.

The ward surgeon, before entering the ward, discarded superficial clothing, and wore a sheet covering the body from the neck to the heels. Each time after leaving the ward he subjected himself to a sponging of the face and hands in a 1:1000 bichloride solution. This was followed by a shower bath and an entire washing with soap and water.

After a period of eleven days the quarantine was raised on the recommendation of a board of three medical officers, by whom each patient in the ward was examined. Captain Kulp made the gratifying statement, in his report, that practically every man of the hospital corps appeared anxious to secure experience in nursing this disease, the spread of which was prevented by the intelligent cooperation of the officers and men of the hospital.

A second case in a quartermaster's employee was reported by the health board of Manila. This case is said to have recovered. It

occurred in the quartermaster's corral on May 27. There were more than 400 employees in and about this corral. Two hundred and forty of them slept in one set of quarters, a bunk house of nipa and bamboo. Few of them paid any attention to personal hygiene, and their sanitary surroundings were miserable. Major Edie's opinion, from his experience as health officer of Manila, is that little difficulty will be found in controlling the plague in any intelligent community with modern sanitary conditions. His report, which deals with smallpox and leprosy, as well as plague, is submitted in this place:

I have the honor to make the following report on the work of the board of health of the city of Manila. My duties with the board of health were pursuant to the following orders: Special Orders No. 181, paragraph 10, headquarters Department of the Pacific and Eighth Army Corps, Manila, P. I., July 5, 1899, and Special Orders No. 142, paragraph 5, headquarters provost-marshal-general, Manila, P. I., July 31, 1899. Before receiving the first order I was taken down with typhoid fever, and had a relapse a few days after complying with the second, so that my duties with the board of health really began on August 28, 1899.

The medical personnel of the board for the past year has been as follows:

Lieut. William J. Calvert, assistant surgeon, United States Army, in addition to his other duties as regimental surgeon, Sixth United States Artillery, and attending surgeon on the prisoners of war, was assigned to duty on the board of health, July 31, 1899. He was relieved from his other duties January 7, 1900, and, besides directing the bacteriological department of the municipal laboratory, has had charge of the plague hospital.

Capt. Charles Lynch, assistant surgeon, United States Army, reported for duty with the board, December 24, 1899; Maj. Ira C. Brown, surgeon, United States Volunteers, January 9, 1900; Acting Asst. Surg. Julius C. LeHardy, United States Army, January 26, and Acting Asst. Surg. Harry L. Gilchrist, June 16, 1900, the latter relieving Major Brown who had been ordered for temporary duty with the transport *Hancock*. During the temporary absence of Assistant Surgeon Calvert in Japan, in March and April, Acting Asst. Surg. Joseph J. Curry, United States Army, conducted the bacteriological department, made all autopsies, and rendered valuable service in other ways.

Dr. C. H. Pardo-Tavera and Dr. Ariston Bautista Lim, both of Manila, have been honorary members of the board of health since its organization in September, 1898.

As originally organized the city had 10 districts with 8 municipal midwives, and for each district a native physician, whose duties were to attend to the indigent sick, report unsanitary conditions and infectious diseases, and investigate and give certificates of death to all cases that have died without medical attendance. By the extension of the city limits to Pandacan and Santa Ana a new district was created, which was provided with a physician, a native of the district.

Besides the general functions belonging to a board of health in supervising all works and conditions affecting the public health, the board had general supervision over the charitable institutions, prisons, and venereal hospital, and the direct control of the vaccine farm, municipal laboratories, bacteriological and chemical, which the board organized, free dispensary, hospitals for leprosy, smallpox, and bubonic plague, and much other work that the individual members were from time to time called upon to do.

Registration of births, marriages, and deaths.—The department of registration of births, marriages, and deaths in former times was in charge of the parochial priests. The board has endeavored to keep these records, but it only pretends to accuracy in the records of deaths. It also required the registration of physicians, pharmacists, and dentists practicing their professions. It was with some difficulty that the superintendents of the parochial cemeteries could be prevented from interring bodies without a burial permit and make the weekly return of burials required. After a clear understanding of the necessity of these requirements the regulations were complied with.

A municipal dispensary, where the indigent sick can obtain medicines free of cost, has been in operation since December, 1899. Nevertheless the majority of births and deaths occur without medicines or medical treatment.

Vaccination and smallpox.—The board continued the work of vaccination and revaccination begun by Major Bourne. The result of this work is shown in the table of mortality statistics. For the nine months from October, 1899, to July, 1900, there were 7 deaths in this city from smallpox, whereas in the month of March alone, in

1899, there were 75 deaths from this disease. The subjoined table shows the number of vaccinations, by months. This work was done under difficulties, as the authorities thought it advisable not to permit forcible vaccination. Many cases of smallpox came into the city from the country districts, and the board sent its vaccinators to all outlying towns and villages for the purpose of vaccinating every inhabitant. Records of these vaccinations were not returned except from the town of Malabon. After the dispersion of the Filipino army, as the country became opened up, the military surgeons in every district, under directions from the chief surgeon's office, began the vaccination of the inhabitants, and the output of the vaccine farm had to be largely increased, as is shown in the attached table. This increase was made with little additional expense, and every demand for vaccine virus was promptly met. When the present wet season is over, and this subject of vaccination in the provinces is vigorously taken hold of and carried on until every person in these islands has been vaccinated and revaccinated, the vaccine station will be prepared to furnish the necessary amount of virus.

Leprosy.—Leprosy was introduced here in 1633. The Emperor of Japan sent a ship with 150 lepers as a present, to be cared for by the Catholic priests. These lepers were allowed to land, and as no practical methods were ever adopted to eradicate the disease or prevent its spread, it steadily increased, until now, according to the estimates of the Franciscan fathers, there are not less than 30,000 lepers in the archipelago, the larger number being in the Visayas. Under the Spanish régime the order of the Franciscans had charge of the charity work among the lepers. Several hospitals and asylums were built, the largest of which, San Lazaro Hospital, is located in Manila, and has a capacity for 400 patients. When a house-to-house inspection was inaugurated last January, more than 100 lepers were found concealed in houses and were sent to San Lazaro Hospital. Many others escaped into the surrounding country. The necessity of the segregation and isolation of the lepers on one of the islands was early recognized and agitated by the board of health. As soon as the conditions permitted, the authorities appointed a commission to select a suitable island or islands for this purpose and to present plans and estimates for buildings and to formulate the necessary regulations. This commission is now engaged in this work.

Bubonic plague.—The first case of plague in this city of which we have any knowledge occurred in No. 14, Calle Legaspi, Intramuros, on December 29, 1899. There was a death in this house, the diagnosis on the death certificate being typhoid fever. Two days later, December 31, a second death was reported from the same house with a similar diagnosis. These two cases died without medical attendance, and the diagnosis was made by the municipal physician of the district after death. On January 2, a boy was removed from this house to the San Juan de Dios Hospital, having been taken sick the day previous, and the notification required in cases of infectious diseases reached this office on the 2d, the diagnosis being typhoid fever. Assistant Surgeon Calvert and myself visited this boy at the hospital and found him presenting the clinical aspect of plague. The inflamed gland was in the left femoral group; it was about the size of a pigeon's egg, and very tender to the touch. The boy was at once removed to the pest hospital, which, in anticipation of an increase of smallpox, had been constructed of tents, as the authorities had decided that the state of the public funds did not justify the expenditure necessary to erect a pest hospital. On January 3, 2 cases were discovered at No. 8, Calle Legaspi; on the 6th, 1 case at No. 6, Legaspi; on the 13th, 2 more cases developed at No. 8, Legaspi. Bacteriological examinations and culture growths were made in nearly all the cases. A report of this work, with a description of the clinical features of the plague as it appears here, will be made by Assistant Surgeon Calvert.

The methods adopted to control and eradicate the disease were:

1. The prompt detection and isolation of plague cases.
2. Removal of persons who had been in close communication with an infected case to the suspect wards at the hospital.
3. Removal of all other inmates in the infected houses to the detention wards at the hospital, or quarantining such inmates in the house for 14 days.
4. Thorough disinfection and redisinfection of the house, its contents, and inmates; clothing and bedding disinfected by steam. All articles that could not be thoroughly disinfected were burned.
5. The inspection of all dead bodies of Chinese.
6. The distribution of rat poison in all houses by the inspectors themselves.
7. The disposition of the dead: Cremation principally. On account of the religious prejudices of the Chinese, their dead—the coffins being filled with disinfectants and quicklime—were buried in the "plague plot."

To carry out the first provision, a house-to-house inspection was inaugurated at once. This is still continued in certain sections of the city. With the assistance of Major Tiernan, chief of police, a corps of 100 inspectors was organized within 36 hours. These inspectors were Filipinos, for the most part medical students. It was impossible to obtain soldiers for inspectors. The city was divided into 10 districts and each district into three subdistricts, and instructions and regulations written in Spanish were furnished each inspector. Ambulances and carts for carrying disinfectants were provided. This force on January 9, 1900, was turned over to Maj. Ira C. Brown, surgeon, United States Volunteers, and, under the direction of that energetic and efficient officer, did excellent service, much better than we had hoped for. No one who has not been in close touch with an Eastern city and the mode of life of its inhabitants can realize what a sanitarian has to wrestle with in this country. The density of population and the consequent overcrowding in the city is appalling, and, if it continues, is sure to bring disaster. Major Brown, in connection with his sanitary inspectors, utilized the fire department to clean a large part of the city. All drains were opened and flushed, the interiors and rears of houses were cleaned and whitewashed, and an immense amount of other work was accomplished by this officer. At the same time the regular sanitary department was doing its usual good work.

For the prompt detection of plague cases among the Chinese and the prevention of concealed cases much is due to the Chinese consul and Mr. Palanca. The latter is especially influential among his fellow-countrymen from Amoy. At his instance the Chinese merchants furnished from their own number 40 inspectors, who made daily house-to-house inspections in the Chinese districts, and I do not believe that any case of sickness escaped them. This work was continued for two months at their own expense. The Chinese also built a pest hospital for the care of their own people and have paid all of its running expenses. Acting Assistant Surgeon Le Hardy, a very energetic and capable young officer, was assigned to duty in the Chinese district, and every Chinaman dead of any disease was inspected by him. The disease has been confined almost entirely to the native and Chinese populations. Only two white men have contracted the disease. These were teamsters in the quartermaster's corral. The first of these cases was reported on the night of May 20 from one of the military hospitals as a suspicious case, and was removed to the pest hospital, where he died the next day, May 21. The autopsy and culture growths proved it to be a case of plague. The second case occurred in the bunk house of the corral on May 27. This case recovered. There were more than 400 employees in and about this corral. Two hundred and forty of them slept in one bunk house made of nipa and bamboo. Few of them paid any attention to personal hygiene, and their sanitary surroundings were miserable. Every condition except famine favorable to an outbreak of the disease among these people was present. That no outbreak did occur is due to the prompt and efficient methods adopted, which were carried out under the personal supervision and direction of Assistant Surgeon Lynch, who, here as elsewhere, proved himself to be a willing and capable officer. No infection occurred in our forces handling cases of plague, either in or out of the hospital. The opinion I have formed of plague from the experience of the past six months is, that little difficulty will be experienced in controlling it in any intelligent community with modern sanitary conditions. The board made early application to the government laboratories in Bombay for Haffkine's vaccine material. Some was obtained from the marine-hospital surgeon, who has also recently received some Yersin serum. It is almost impossible, without force, to use the Haffkine vaccination on Chinese or natives. A thorough test has not been given to either the Haffkine material or the Yersin serum, but we have not been favorably impressed with either. Dr. Calvert at a later date will make a full report on this subject, also on his work in this line.

I can not speak in too high terms of the absolute fearlessness, energy, and cheerful cooperation of every medical officer associated with me in this work, and of the faithful and efficient services of Acting Steward Thomas McL. Van Wyck and Private James F. Beahan, Hospital Corps, United States Army, who have been on duty with the board of health.

Respectfully,

GUY L. EDIE,
Major and Surgeon, U. S. V., President Board of Health.

The following papers formed appendices to Major Edie's report:

Amount of vaccine virus furnished by the board of health of Manila to the Army and Navy of the United States, and to the native inhabitants of the archipelago outside of the city of Manila, from July 1, 1899, to June 30, 1900.

Date.	Army and Navy.	Natives.	Total.
1899.			
July	6,520	700	7,220
August	3,120	3,720	6,840
September	5,230	3,100	8,330
October	6,720	4,310	11,030
November	2,830	7,070	9,900
December	5,900	2,230	8,130
1900.			
January	21,700	5,800	27,500
February	24,020	36,900	60,920
March	16,590	129,140	145,730
April	8,230	137,910	146,140
May	8,410	102,000	110,410
June	6,180	73,660	79,840
Total	115,450	506,540	621,990

Report of the number of vaccinations in Manila and suburbs, Presidio, Bilibid, and Malabon from July 1, 1899, to June 30, 1900.

Date.	Manila and suburbs.	Presidio.	Bilibid.	Malabon.	Total.
1899.					
July	9,148			4,167	13,315
August	15,023				15,023
September	8,297				8,297
October	6,159				6,159
November	5,588		783		6,371
December	4,228	318			4,546
1900.					
January	5,084				5,084
February	4,455			3,046	7,501
March	7,005			5,143	12,148
April	15,036			5,576	20,612
May	8,437				8,437
June	5,561				5,561
Total	94,021	318	783	17,932	113,054

Record of mortality by months from October, 1899, to July, 1900.

[Population estimated at from 350,000 to 600,000.]

Month.	Number of burials with permits.	Number of burials without permits.	Total number of deaths.	With medical attendance.	Without medical attendance.	Children under 5 years.	Number of deaths from— Tuberculosis.	Beriberi.	Malarial fevers.	Diarrheal diseases.
October	942	242	1,184	224	960	450	65	55	29	72
November	1,090	145	1,235	207	1,028	515	103	160	34	136
December	1,092	70	1,162	232	930	502	115	143	36	157
January	1,055	.....	1,055	335	720	396	126	121	56	126
February	884	.....	884	315	569	344	119	71	46	131
March	887	.....	887	302	585	371	128	38	43	130
April	805	.....	805	263	542	354	126	27	30	119
May	724	.....	724	238	486	344	119	17	30	100
June	599	.....	599	181	418	231	91	10	34	102
Total	8,078	457	8,535	2,297	6,238	3,507	992	642	338	1,073

Record of mortality by months from October, 1899, to July, 1900.—Continued.

Month.	Number of deaths from—						Remarks.
	Acute lung diseases.	Typhoid fever.	Smallpox.	Bubonic plague.	Leprosy.	Measles.	
October	60	4	.....	.....	8	.....	Chinese not being on record, 72 carried as without medical attendance.
November	100	2	1	.....	6	.....	Chinese not being on record, 75 carried as without medical attendance.
December	72	4	.....	1	13	.....	Chinese not being on record, 62 carried as without medical attendance.
January	75	2	3	11	7	2	Chinese regularly on record from January 15, 65.
February	83	6	2	35	4	1	Chinese, 80.
March	68	5	1	19	3	1	Chinese, 72.
April	61	6	.....	44	1	.....	Chinese, 63.
May	66	8	.....	17	2	.....	Chinese, 39.
June	45	4	.....	11	2	.....	Chinese, 35.
Total	630	41	7	168	46	4	

Record of mortality by nationality from October, 1899, to July, 1900.

[Population estimated from 350,000 to 600,000.]

Month.	Filipinos.	Spanish.	American.	Swiss.	Italian.	French.	Portuguese.	Austrian.	Chinese.	Malay.	German.	Japanese.	British Indian.	Australian.	Cuban.	Guam.	Scotch.	English.	Total.
October	930	4	2	1	...	...	...	...	4	...	...	...	...	...	...	...	...	1	942
November	1,071	6	2	...	1	1	1	...	5	2	...	...	...	...	...	...	...	1	1,090
December	1,069	14	2	...	...	...	...	1	3	...	...	...	...	...	...	...	...	3	1,092
January	974	11	3	...	...	...	...	...	65	...	1	1	...	...	...	...	...	...	1,055
February	788	13	1	...	...	1	...	...	80	...	...	...	...	...	...	...	...	1	884
March	802	10	1	...	...	...	...	...	72	...	...	...	...	...	...	...	...	2	887
April	731	6	1	...	...	...	...	...	63	...	...	...	1	1	1	...	...	1	805
May	674	4	2	...	...	...	...	...	39	...	...	...	...	...	...	...	...	5	724
June	552	8	1	...	...	...	...	...	35	...	...	...	...	...	...	1	1	1	599
Total	7,591	76	15	1	1	2	1	1	366	2	1	1	1	1	1	1	1	15	8,078

Report of cases of bubonic plague, deaths, recoveries, disinfection of houses and the placing of rat poison, from January 1 to June 30, 1900.

Month.	Whole number of cases.	Whole number of deaths.	Cases reported each month.	Cases recovered.	Number of deaths.	Number of houses disinfected.	Number of houses in which poison was placed.[1]
January	18	11	18	7	11	26	.....
February	66	46	48	13	35	58	.....
March	130	95	64	15	49	54	.....
April	184	139	84	10	44	499	.....
May	206	156	22	5	17	361	.....
June	225	167	19	8	11	143	2,039
Total	829	614	225	58	167	1,141	2,039

[1] As no records were kept of the number of houses in which poison was placed, to June, it is impossible to fill out report, but the month of June can be taken as a fair average for the preceding months, as the like amount of poison had been used since January 1.

Report of cases of bubonic plague, deaths, recoveries, disinfection of houses and the placing of rat poison, from January 1 to June 30, 1900—Continued.

	Cases.	Deaths.
Natives	63	51
Chinese	160	115
Americans	2	1
Total	225	167

REPORT OF FIRST LIEUT. W. J. CALVERT, ASSISTANT SURGEON, UNITED STATES ARMY, ON THE CASES ADMITTED INTO THE PLAGUE HOSPITAL.

MANILA, P. I., *July 13, 1900.*

SIR: In compliance with your instructions of July 2, 1900, I have the honor to make the following preliminary report:

The larger proportion of cases have been admitted to the Plague Hospital a few hours before death; a few cases, however, have been observed almost from the onset of the disease.

The period of incubation varies from at least two to ten days. Fever, headache, and oftentimes tenderness of the lymphatic glands are the first symptoms noted. The temperature rises suddenly. The course of the fever is irregular. It may be fairly regular in some cases, while in others the curve is remittent or intermittent in type. Frequently the temperature drops to normal, followed by a sudden rise to 39.5°C.–40.5°C., and death. The remittent type, closely resembling the septic type, seems to be most common.

Headache is quite constant, severe, and persistent.

The tenderness of the lymphatic glands may develop with the fever; in other cases no tenderness or enlargement of the glands can be discovered until a few hours before death.

On inspection the patient is found lying on the side, with the thighs flexed on the trunk to relieve the pain, and with the eyes turned away from the light; if lying on the back, the thighs remain flexed. None of the cases have shown any lesions of the skin peculiar to plague, except as noted in the post-mortem records. The hemorrhages, if any, develop later in the course of the disease.

The facial expression is that of intense pain, frequently mixed with anxiety and fear. The eyes, as a rule, are rather dull, but in a few cases no change in expression occurs and the eyes are bright.

The lips are usually dry and the tongue heavily coated, white, often furrowed, while the edges are clean, bright red, and œdematous.

Thus far I have seen nothing particular in the tonsils.

The thorax in all of the cases was clear, excepting a few râles, which had no particular significance. The respiration is usually rapid, shallow, and oftentimes labored.

The pulse varied, naturally, with the febrile condition of the patient, and in no case presented any peculiarity. As a rule the pulse was rapid, easily compressed, and oftentimes stringy. The heart's action is feeble.

The abdomen presented nothing of importance. One case presented pain in the right inguinal region, due to the enlarged iliac glands. The genitals showed nothing of importance.

The blood showed marked increase of polymorphonuclear leucocytes.

The patient is usually constipated and the urine scanty.

The mental condition of the patient is very variable. Frequently it is benumbed at other times the patient is semicomatose and very restless. Rarely is the patient irrational.

Vomiting is often present. It is accompanied by no pain and does not seem to indicate in any way the condition of the stomach or the severity of the disease.

The lymphatic glands enlarge rapidly. They are hard, in the early stages isolated, and freely movable. The glands of the same group rapidly become infected. The blocking of the lymph channels causes marked œdema in the tissues around the infected glands. The inflammation rapidly extends into the surrounding tissue and to the skin, forming one large, irregular, immovable mass. In some cases the skin is reddened, but in none of the cases have hemorrhages or carbuncles developed. The skin is often œdematous. Neither the time of development nor the degree of tenderness in the glands is constant. The tenderness of the glands may be among

the very first symptoms observed. On the other hand, in some cases it is not noticed until a few hours before death. The pain is, as a rule, exquisite and the patient invariably assumes a position in bed best suited to relieve as far as possible all pressure on the glands. The degree of tenderness does not seem to depend entirely on the degree of enlargement of the glands.

Thus far 25 post-mortems have been made on cadavers dead from pest. A brief synopsis only of these will be given, as the greater part of the work can not be reported at this time.

The facial expression seen on those dead of plague is similar to that described above.

In 6 of the 25 autopsies subcutaneous hemorrhages were observed; only one however was well marked. This case presented numerous small hemorrhages on the face, upper extremities, and trunk, most marked on right side.

Owing to the frequent glandular enlargements met with in this region, the record of enlarged glands at post-mortem from pest can not be entirely relied upon per se. Only the larger glands were noted. The following records from enlarged glands gives the complete glandular enlargement. As will be seen, frequently two or more groups of enlarged glands occurred in the same subject.

In the 25 autopsies, enlarged glands were found five times in the neck, or 20 per cent; six times in the right axilla, or 24 per cent; seven times in the left axilla, or 28 per cent; sixteen times in the right inguinal and femoral region, or 48 per cent; fifteen times in the mesentery, or 60 per cent; and six times in the iliac glands, or 24 per cent. During life the glands are easily felt and oftentimes easily seen, but however large during life, at the autopsy the swelling seems to have largely diminished or entirely disappeared.

On section the tissue surrounding the glands is infiltrated with a straw-colored gelatinous serum. The extent of this infiltration varies, frequently extending over an area having a radius of 6 or 7 cm. This infiltrated tissue is often hemorrhagic, and owing to the enormous venous distension, bleeds on the slightest injury. The condition of the glands varies according to duration of the disease. In rapidly fatal cases the glands are only slightly enlarged, hemorrhagic; while in the cases of longer standing the glands are very large, hard to the touch, but on section found to be soft in the center. In 6 of the 25 autopsies, the chain of glands extending from the inguinal group into the abdomen, along the iliac group to the left side of the spinal column, were greatly enlarged and surrounded by widespread, retroperitoneal hemorrhages. In one case the hemorrhage extended throughout the entire retroperitoneal tissue. These glands seemed to be enlarged out of all proportion to the external glands.

In rapidly fatal cases the plague organism was obtained in pure culture from enlarged glands wherever found; in cases of longer standing mixed cultures were always obtained.

The peritoneal cavity and pelvis, except in the 6 cases showing enlarged retroperitoneal glands and hemorrhages, were normal, excepting an occasional punctate hemorrhage and distended venule.

The spleen in all cases was soft and of a brick-dust color. It was greatly enlarged in 18 cases, moderately enlarged in 1, practically normal in 2, and very small in 1. The weights were not taken.

The liver and kidneys were markedly congested.

The stomach when examined showed mucous gastritis with more or less punctate hemorrhages. The intestines frequently showed some enteritis with a few small hemorrhages, otherwise normal.

The heart was in all cases greatly distended, especially the right side. Subpericardial hemorrhages were noted in 13 cases. The heart muscle was pale and flabby.

The lungs in 9 cases showed subpleural hemorrhages and a varying degree of congestion and œdema in all cases; in 3 cases broncho-pneumonia was seen.

From the enlarged glands spleen and blood cover slip preparations show a short round-end bacillus, occurring singly, in pairs end to end, in chains of from four to six, and oftentimes in small clumps. These organisms take all the ordinary stains and rapidly decolorize by Gram. The poles of the bacilli often take a deeper stain than the center, frequently resembling a diplococcus.

Forty-eight-hours-old colony is small, round, even-edged, semitranslucent, and of a milky-white color; by transmitted light slightly bluish.

On neutral plain agar the organism produces a fairly abundant growth, which at twenty-four hours is semitransparent and slightly whitish; at forty-eight hours it is of a more opaque white color and of a glutinous consistency.

On glucose agar slants the growth is not so abundant as on plain agar. In stab culture no gas is produced. The growth extends along the entire stab and is of a whitish color.

On acid potato the growth is scanty, moist, and after forty-eight hours of a slightly yellowish color.

Milk is not coagulated. Litmus milk is not reddened, but old cultures are slightly paler than the original tube.

Cover-glass preparations made from culture tubes show a short, round-end bacillus, occurring singly, in pairs, and in chains of from 4 to 6 bacilli. These organisms stain by all of the ordinary stains and rapidly decolorize by Gram's stain.

House rats inoculated subcutaneously with this organism die in from thirty to sixty-five hours. At autopsy the inguinal and axillary glands are found to be enlarged, hemorrhagic, and frequently soft in the center. Cover-glass preparations made from these glands show organisms identical with those above described. The same organism is abundant in the blood. The spleen is enlarged, soft, and oftentimes hemorrhagic. Hemorrhages are found in the lungs, stomach, intestines, liver, and kidneys. All of these organs are congested. Cultures from these organs show the original organism.

Monkeys inoculated with this organism die in from seventy-two to one hundred hours. The autopsy reveals the same lesions as seen in the rats and the organism can be recovered from any of the organs. Later a detailed report will be made.

Very respectfully, your obedient servant,

W. J. CALVERT,
First Lieutenant and Assistant Surgeon, U. S. A.

THE PRESIDENT OF THE BOARD OF HEALTH,
Manila, P. I.

Lieut. W. J. Calvert, assistant surgeon, United States Army, on duty with the board of health of Manila, was sent on a special visit to certain cities in Japan and to Hongkong, China, with a view to learning the measures in use for dealing with the infection of bubonic plague. His report, dated May 24, 1900, is as follows:

I proceeded to Japan, per paragraph 7, Special Orders, 48, via United States Army transport *Sheridan*, which left Manila March 6, 1900. On arriving at Nagasaki, I proceeded by first available steamer to Yokohama and from there to Tokyo by rail. On my way back to Manila I visited Kyoto, Osaka, Kobe, and Hongkong.

On returning from his studies in Germany Dr. Kitasato established, in Toyko, a hospital for infectious and contagious diseases; a well-equipped laboratory with a library pertaining to this department of medicine, and a farm and laboratories for the preparation of antitoxins. Later the Japanese Government, recognizing the importance of this work, made it a Government institution under the supervision of Dr. Kitasato.

The hospital is of Japanese architecture and comprises all of the modern sanitary improvements, a large steam sterilizing apparatus, and a well-equipped studio for photography and microphotography. The laboratory is a large two-story frame building, in which the routine laboratory work of the hospital is carried on, and original investigations in bacteriology, pathology, and general treatment of these diseases pursued. Special investigations on the pathology and serum treatment of tuberculosis, dysentery, typhoid fever, and plague are now in progress. Dr. Kitasato's staff comprises a number of well-trained doctors. In addition, the chief officer of health of Tokyo and the chief quarantine officer of Yokohama are pursuing in this laboratory original investigations in connection with their departments. In difficult or doubtful cases these officers make the necessary examinations, leaving the ordinary routine work to their assistants. The serum farm is located in the outskirts of Tokyo. The equipment here consists of a small laboratory, stables, apparatus for handling animals, and a large lot in which the animals are allowed exercise. The serum laboratory is located in Tokyo, and is equipped with power centrifugalizers and concentrating and boiling apparatus.

A brief description of the preparation of plague antitoxin will be given. Large quantities of sterile cultures of the plague bacilli are repeatedly injected into the horse at intervals of two weeks. After from eight to twelve inoculations a small quantity of serum is prepared for experimentally testing its strength. When larger quantities of serum are desired, from 2,000 to 2,500 c. c. of blood are withdrawn from the jugular vein. The blood is then whipped, centrifugalized, and the clear serum drawn off and made a one-half per cent solution of carbolic acid. It is then ready for use. Three days after blood is withdrawn from an animal, another inoculation is made, and two weeks later blood may be again withdrawn. This cycle may be repeated as often as desired.

Thus far serum has been prepared which has a protective power, but at present is not successfully used for therapeutic purposes. It is claimed by some that when used in very large quantities, the serum reduces to some extent the mortality. Serum mixed with equal parts of sterile cultures is sometimes used to protect exposed persons. From 0.6 to 0.8 c. c. of this mixture is used for the first injection. The serum is supposed to give immediate protection while the toxin in the sterile culture is being converted into antitoxin. After the reaction has subsided from 0.8 to 1 c. c. of sterile culture is used for the second injection. Thus far plague antitoxin sufficiently strong for therapeutic use has not been made or is not generally known.

At the present time there is no plague in Japan. Suspicious cases of plague occurring on the island are immediately reported to the Institute for Infectious Diseases. If necessary Dr. Kitasato or some member of his staff visits the infected district to give any possible assistance. Patients dying of plague are buried in a separate cemetery. The cadaver is well covered with chloride of lime.

The Japanese propose to pursue the following methods in the event of another epidemic in Japan:

Situated as Japan is, sea quarantine is the only method of preventing the introduction of plague. At present their quarantine laws are most stringent and well carried out. In the event of an epidemic a strict land quarantine would be established, when all trains, etc., leaving an infected district would be inspected. If a suspected case of plague should be found, the patient and all passengers in the infected wagon would be isolated and the wagon and effects of the passengers disinfected.

The entire infected district would be quickly and thoroughly cleaned. This cleaning process would be quickly extended to surrounding and distant districts, so that in a short period of time the entire island would be in as good sanitary condition as possible. While the cleaning is in progress an attempt would be made to kill all the rats. A stated price is given for each rat brought to a designated officer.

A systematic search is made for the sick and all cases of plague or suspected plague immediately reported. The patients, their families, and immediate neighbors are immediately isolated and their houses and effects disinfected. In this way those exposed to the disease are easily watched and are allowed to return to their homes after a period sufficiently long (ten days) to insure the nondevelopment of the disease. An attempt is made to teach the general public the nature of plague, its modes of spreading, and the individual precautions to be taken. This information is given through the public press, schools, and places of worship.

Protective inoculation will probably be extensively used, more especially on those exposed to the disease. The protective power develops after from eight to ten days, and if developed from toxins is of long duration not definitely determined. The immediate family of the patient will probably be inoculated with the mixture of serum and toxin.

The treatment of the patient will be the early extirpation of the bubo, injection of large quantities of serum, treatment of symptoms as they arise, with especial reference to the heart. A well-selected diet will be given. Extreme care of the hospital must be taken, especially with respect to illumination, ventilation, and contamination.

Plague is practically always present in Hongkong. A corps of inspectors make a house to house inspection and all cases or suspected cases of plague or other contagious or infectious diseases are immediately sent to Kennedytown Hospital. Systematic disinfection is employed in the plague-infected districts and in houses in which isolated cases of plague are found.

All cadavers found in the streets or unclaimed are sent by the police or inspectors to the mortuary, where the necessary examination and the proper disposition of the bodies are made. All plague cadavers are buried in the plague cemetery, which is on the slope beyond Kennedytown Hospital. The bodies are well covered with chloride of lime.

The mortuary is in an isolated spot on the slope near the outskirts of the city. It consists of several small brick buildings, well drained and equipped for complete post-mortem examinations.

The Kennedytown Hospital is a large substantial building situated in the extreme outskirts of the city and used for infectious and contagious diseases. Around the main building are a number of nipa wards in which plague patients are treated. The floors of these wards are built about 2 feet above a concrete pavement, enabling almost perfect cleanliness to be maintained.

In conclusion, I wish to thank Dr. Kitasato and his assistants for their courtesies so generally extended to me while in Tokyo.

MUMPS.

Of this disease there were reported in 1898 2,075 cases in the Army, regulars and volunteers, equivalent to an admission rate of 14.04 per thousand of strength. The largest rate, 48.54, was given by volunteers in the Philippine Islands. In 1899 the Army rate, volunteers and regulars, was 17.42, the largest rate being again in the Philippines, where 22.94 per thousand was recorded. No fatality occurred among these cases.

As the average annual rate for the decade 1888–1897 was only 5.63 per thousand, the increase to 14.04 in 1898 and 17.42 in 1899 shows the influence of aggregation in large camps and garrisons on the prevalence of the disease.

DIPHTHERIA.

In the Army, regulars and volunteers, 59 cases of diphtheria, with 4 deaths, were reported in 1898, and 58 cases, with 5 deaths, in 1899. The colored troops were comparatively free from this affection. No special report was rendered on this disease during the past year.

ERYSIPELAS.

A noticeable decline has taken place in the prevalence of erysipelas in our Army of late years, which may be ascribed to the progress of aseptic surgery. During the decade 1888–1897 the average annual rate of admission for erysipelas was 1.94 per thousand of strength, a rate which was reduced in 1898 to 0.64, and in 1899 to 0.84. In 1898 there were 94 cases, with 1 death; and in 1899 92 cases, with 4 deaths.

TYPHOID FEVER.

On August 18, 1898, a board of medical officers consisting of Maj. Walter Reed, surgeon, United States Army; Maj. Victor C. Vaughan, division surgeon, United States Volunteers, and Maj. Edward O. Shakespeare, brigade surgeon, United States Volunteers, was appointed to investigate into the causes of the extensive prevalence of typhoid fever in the various camps in the United States, to call the attention of the proper commanding officers to any insanitary conditions in the camps visited, and to make recommendations with a view to their prompt correction. The report of this board has lately been received and is now on file in the library of the Surgeon-General's Office, where it may be consulted by those desiring to see the original data on which the conclusions of the board are based. An abstract of the report has already been published. In expressing my high appreciation of the able and painstaking manner in which the board accomplished the task imposed upon it, I desire to express my sincere regret at the death of Major Shakespeare, which occurred shortly after he had completed his arduous labors as a member of this board.

The subject of typhoid fever in our military camps was discussed also at some length in my last annual report. It will suffice, therefore, at the present time for me to present the statistics of the Army for 1899, together with the completed statistics, including the volunteer records, for the year 1898.

In 1898 there were reported 20,926 cases, with 2,192 deaths and 44 discharges on account of disability consequent on the disease. These

numbers represent an admission rate of 141.59, a death rate of 14.83, and a discharge rate of 0.30 per thousand of the mean strength. The deaths constituted 10.48 per cent of the cases, equivalent to 1 death in 9.55 cases.

The relative prevalence and mortality were greatest among the troops in Porto Rico, where the admission rate was 294.74 and the death rate 34.60 per thousand of the strength. Among these troops there were 1,678 cases, of which 197 proved fatal, the deaths constituting 11.74 per cent of the cases, or 1 death in 8.52 cases. The largest absolute number of cases was reported from the camps in the United States, 17,686 cases, of which 1,749 proved fatal, the admission rate being 143.48 and the death rate 14.19 per thousand of the mean strength. The fatal cases constituted 9.89 per cent of the total, equivalent to 1 death in 10.11 cases.

In the Army, regulars and volunteers, in 1899, 2,184 cases of typhoid fever were reported, with 258 deaths and 24 discharges on account of disability caused by the disease. These numbers are equivalent to the ratios of 20.69 admissions, 2.44 deaths, and 0.23 discharges per thousand of the mean strength. The deaths constituted 11.81 per cent of the cases, equivalent to 1 death in 8.47 cases. The rates were lowest among troops serving in the United States and highest among those in garrison in Cuba. The admission and death rates among the former were 10.85 and 1.07 per thousand of strength, and among the latter 39.40 and 4.24.

In 1898 the difference in the susceptibility of volunteers and regulars was strongly marked, the admission rate of the former having been nearly double that of the latter, 166.03, as compared with 88.56 per thousand of strength. The explanation of this lies in the fact that most of the regulars were seasoned soldiers capable of taking care of themselves under exposures and of avoiding, under the supervision of experienced officers, many of the insanitary conditions which propagated the disease among the volunteer commands. The volunteers reported 16,796 cases, with 1,738 deaths, showing a fatality of 1 case in 9.66, or a percentage of 10.35 fatal cases. The cases among the regular troops were of a similar character as to gravity, for 1 death occurred in every 9.10 cases, or 10.99 deaths in every hundred cases. The death rate per thousand of strength was only 9.74, as compared with the death rate of the volunteers 17.18, owing to the much larger number of men affected per thousand of the volunteer strength.

In 1899 the typhoid-fever rates of both regulars and volunteers became materially lowered. Among the former 1,481 cases with 180 deaths were reported, equivalent to the respective rates of 22.98 and 2.79 per thousand of strength. The fatal cases constituted 12.15 per cent of the total number of cases, equivalent to 1 death in 8.23 cases. Among the latter 703 cases with 78 deaths were reported, equivalent to the respective rates of 17.10 and 1.90 per thousand of strength. The fatal cases constituted 11.10 per cent of the total number of cases, equivalent to one death in 9.01 cases. This somewhat greater prevalence of typhoid fever among the regulars is explained by the recruitment of these troops to 65,000 men and the prompt shipment of these recruits to join their regiments, most of which were on active foreign service, while the United States Volunteer regiments which were raised later in the year, passed a considerable time in well-constructed and equipped camps of organization before embarking for service in the

Philippines. The relative freedom of both regulars and volunteers during this year, as compared with 1898, must be ascribed to the care exercised in securing purity of water supply, removal of excreta, and thorough cleanliness of the camps and their surroundings.

According to the records, the colored troops were much less liable to become affected with typhoid fever than the white troops, but when attacked the colored men succumbed more readily to the disease. The following tabulation compares the admission and death rates per thousand of strength of the two races during the years 1898 and 1899:

Year.	White.		Colored.	
	Admission rate.	Death rate.	Admission rate.	Death rate.
1898	147.58	15.26	27.97	6.70
1899	21.77	2.52	5.35	1.30

In 1898 the fatal cases constituted 24.15 and in 1899 24.32 per cent of the total cases among the colored men, while the respective percentages among the white troops were only 10.34 and 11.60.

Since the close of the calendar year 1899 two outbreaks of typhoid fever have been reported. The first occurred in March, 1900, among troops stationed at Paete, Laguna Province, Luzon. Two companies of the Forty-second Infantry were stationed at this place, a town of 2,000 inhabitants, situated half a mile from the shore of the lake on a gently sloping bench backed by abrupt hills rising to a height of 1,500 feet. Sixteen patients with diagnosis of malarial fever, diarrhea, and dysentery were sent from this garrison to the division hospital at Calamba. Maj. George H. Penrose, surgeon, United States Volunteers, in charge of the hospital, suspected the presence of typhoid infection in these cases, and Lieut. R. P. Strong, assistant surgeon, United States Army, was sent from Manila to investigate and report. Of the 16 cases, 13 gave a positive reaction by the Widal test. The division surgeon, Maj. H. S. T. Harris, surgeon, United States Volunteers, inspected the sanitary conditions and found the garrison using water from springs in the vicinity of the houses occupied as quarters. These springs were merely the seepage from the branches of a stream which flowed through the town and received all sewage and surface filth. When the town was first occupied the commanding officer, on the recommendation of the surgeon, issued an order prohibiting the use of the water of this stream below a certain point in its course, but this order was said to have been disregarded repeatedly, especially by the members of Company H, Forty-second Infantry, from which came 11 of the 13 cases of undoubted typhoid transferred to the Calamba hospital. By direction of the chief surgeon, Major Harris took with him to Paete two Waterhouse-Forbes sterilizers and orders were issued that no other than sterilized water should be used for cooking or drinking. Four more cases occurred before the epidemic was suppressed.

The second outbreak, in which 54 cases were reported, occurred in the Twenty-sixth Infantry Volunteers, after the arrival of the regiment in the Department of the Visayas and its distribution at various stations on the island of Panay. This command, it is understood, brought the disease from the United States, but the chief surgeon considers it likely that some of the cases may have originated in the

department, as typhoid fever is common among the natives, and a few sporadic cases appeared in detachments of troops which had not been associated with this particular regiment. The cases were sent for treatment to the hospital at Iloilo, and the measures taken to suppress the spread of the infection appear to have been successful.

Concerning the medical history of this regiment the surgeon, Maj. Charles F. Mason, United States Volunteers, reported, under date June 30, 1900, from Jaro, Panay, P. I.:

The regiment was organized at Plattsburg Barracks, N. Y. The first recruits arrived July 15, 1899, the organization of the regiment being complete August 12, 1899. All recruits were reexamined by the regimental medical officers as soon as they joined, a total of 1,597 men being thus reexamined, of whom 197 were discharged as not coming up to the high physical standard required. The troops were quartered in the fine new barracks of the post, and, although somewhat overcrowded, were under good sanitary conditions; nevertheless typhoid fever developed, and the regiment has never been quite free from it since. The first case occurred August 17, 1899, and, like the others developed at that post, is believed to have been due to an infected water supply, that of the post being the same as that of the town of Plattsburg, where there were a number of cases in families using the city water. Even the thirty days' trip across the ocean did not get rid of the infection, 4 cases having developed on the steamer. Up to date there have been 49 cases, with 7 deaths and 6 cases remaining in hospital. In this connection it should be mentioned that typhoid fever, according to the native physicians, is endemic in this island.

The regiment left Plattsburg Barracks September 5, 1899, and reached San Francisco September 17, going out to the model camp for eight days, and sailing for the Philippines September 25, arrived at Manila October 24 and at Iloilo, where it first disembarked, October 27, 1899.

Second attacks.—In eight of the reported cases of typhoid fever the patients, according to the records, suffered from a second attack. In one of these, however—that of J. G., Fifteenth Minnesota—the soldier was on sick report for so short a time during the first attack that this alone throws doubt on the diagnosis. In two—the cases of F. C., First Nebraska, and C. B., Thirty-fifth Michigan—the interval between the attacks was so slight that they may be regarded as cases of recrudescence rather than cases of a recurrence of the disease in the form of a second attack. Singularly enough, in the five other cases reported the patients belonged to the same regiment—the Forty-ninth Iowa—and each had his first attack at Jacksonville, Fla., and his second during the local outbreak of typhoid in that regiment while in camp near Havana, Cuba. This naturally suggests a doubt as to the specific enteric character of the first attack.

The following is a brief abstract of the eight cases as carded from the monthly reports of the various organizations and hospitals. It is to be understood that the diagnosis on each of these reports is typhoid fever:

I. J. G., Company F, Fifteenth Minnesota, was taken on sick report at Camp Ramsey, Minn., August 26, 1898; to duty September 8.

He was again taken on the regimental sick report November 30, and sent to the First Division hospital, Second Army Corps, Camp Mackenzie, Ga., on December 7, whence he was furloughed on January 27, 1899.

II. F. C., Company C, First Nebraska, was taken into regimental hospital July 3, 1898; transferred to the reserve hospital at Cavite, P. I., July 20; returned to duty August 17.

He was again taken on sick report September 20 and transferred to the transport *Rio de Janeiro*, which brought him to the field hospital of the Provisional Division of the Eighth Army Corps at the Presidio of San Francisco, Cal., from which he was returned to duty on November 11, 1898.

III. C. B., Company E, Thirty-fifth Michigan, was taken into regimental hospital October 16, 1898; sent to the First Division hospital, Second Army Corps, Camp

Meade, Pa., October 22, and to civil hospital, Pottsville, Pa., October 23, whence he was returned to duty November 27.

On December 6, 1898, he was again received into regimental hospital, and on the 28th was sent to the First Division hospital, Second Army Corps at Camp Mackenzie, Ga., whence he was returned to duty March 22, 1899.

IV. J. A., Company K, Forty-ninth Iowa, was taken on regimental sick report August 20, 1898, and sent to the Second Division hospital, Seventh Army Corps, Jacksonville, Fla., on the same day, from which he was returned to duty September 22.

He was again taken on the regimental report February 17, 1899, and was transferred March 5 to the Second Division hospital, Seventh Army Corps, Havana, Cuba, where he died March 18.

V. N. F., Company A, Forty-ninth Iowa, was taken on regimental sick report August 22, 1898, and on the same day was transferred to the Second Division hospital, Seventh Army Corps, Jacksonville, Fla., from which he was returned to duty on September 8.

His name again appears on the regimental report as taken sick March 29, 1899, and transferred to the Second Division hospital, Seventh Army Corps, Havana, Cuba, April 1, where he was mustered out July 7, 1899.

VI. W. E., Company D, Forty-ninth Iowa, was received into regimental hospital September 3, 1898, and transferred to the Second Division hospital, Seventh Army Corps, Jacksonville, Fla., September 8, whence he was furloughed October 11.

He was again taken on regimental report March 2, 1899; was transferred to the Second Division hospital, Seventh Army Corps, Havana, Cuba, March 9, from which he was shipped April 6 on the hospital steamer *Missouri* and received into the Josiah Simpson general hospital, Fort Monroe, Va., April 13. He was returned to duty May 3.

VII. P. B., Company B, Forty-ninth Iowa. In regimental hospital September 29, 1898; to Second Division hospital, Seventh Army Corps, Jacksonville, Fla., October 4; to the general hospital, Fort Myer, Va., October 21; returned to duty November 25.

Taken again into regimental hospital, Cuba, March 14, 1899; transferred to the Second Division hospital, Seventh Army Corps, Havana, Cuba, March 15; placed on the hospital steamer *Missouri* April 5; received into the Josiah Simpson general hospital, Fort Monroe, Va, April 13, where he was mustered out May 17.

VIII. S. M., Company F, Forty-ninth Iowa. In regimental hospital October 5, 1898; to Second Division hospital, Seventh Army Corps, Jacksonville, Fla., October 11; to the general hospital, Fort Myer, Va., October 21; returned to duty November 25.

Again on the regimental sick list March 15, 1899; to the hospital steamer *Missouri*, Cuba, April 5; to the Josiah Simpson general hospital, Fort Monroe, Va., April 13; returned to duty May 3.

MALTA FEVER.

In my last annual report, page 286, attention was called to a case of Malta fever, reported July 14, 1899, by Lieut. Walter Cox, assistant surgeon, United States Army, San Juan, P. R. Since then 2 cases were reported by Lieut. W. P. Chamberlain, assistant surgeon, United States Army, while on duty on the hospital ship *Relief* at Manila, P. I. These two men lay on adjacent beds for several weeks. The temperature was neither markedly remittent nor conspicuously undulating, and the original opinion of an irregular form of malaria might have been retained, notwithstanding the failure of the therapeutic test, but for the application of the serum reaction at the laboratory of the First Reserve hospital. Both cases were mild, and suggest little of therapeutic value other than the futility of using quinine in this disease. The study of such cases may throw some light on the etiology of obscure tropical fevers of mild symptomatology, which do not behave like typhoid and do not yield to quinine or show plasmodia in the blood.

In a communication dated January 2, 1900, Acting Asst. Surg. J. J. Curry, assistant pathologist at the First Reserve hospital, called atten-

tion to the probable existence of many cases of Malta fever among the troops in the Philippines. He stated that—

1. Some time ago Dr. Strong, the pathologist, performed an autopsy on a man who had died after a continued fever of long duration. Post-mortem examination was negative as to typhoid and to malarial fever. From the cultures of this case was obtained an organism identical with the coccus melitensis (the causative agent of Malta fever). This organism was inoculated into monkeys and produced the typical symptoms of Malta fever. Autopsy on the animals inoculated showed typical lesions, with the development of the same coccus, which in turn produced the same disease in other animals. Dr. Strong in some manner inoculated himself during these investigations, and has now Malta fever.

2. At a post-mortem examination on a case received from the Second Reserve hospital December 27, 1899, a similar condition was met with as in Dr. Strong's case—i. e., no typhoid, malaria, or other recognized pathological condition. Cultures from this case showed the coccus melitensis.

3. A case of continued fever in the officer's ward of the hospital, whose blood was negative repeatedly to malaria and typhoid, gave the reaction with the melitensis.

4. A case on the hospital ship *Relief*, whose blood gave negative results as above, also reacted with the melitensis.

As the result of the investigations of Dr. Strong, showing the first case to be one of undoubted Malta fever, the second case being also one of undoubted Malta fever, and the positive results of the blood serum reaction of the third and fourth cases, we have evidence that Malta fever prevails here to a considerable extent. It is probable that many of those cases of continued fever which fail to react to Widal's test for typhoid, and which are negative to malaria, are cases of Malta fever. There are a number of such cases in the hospital at the present time, and no doubt the same is true of the other hospitals.

I will start at once the blood examination for Malta fever on all such cases in the hospital. This will mean considerable strain on the laboratory department, which, at the present time, owing to Dr. Strong's illness, is behind in its work. I would, therefore, respectfully suggest that a medical officer with some experience in laboratory work be detailed to assist.

YELLOW FEVER.

During the year 1898 1,169 cases were reported, of which 144 proved fatal, a percentage of 12.32, or 1 death in 8.12 cases. (Six cases, 1 fatal, occurred in the Signal Corps, the strength of which could not be distributed by localities for want of the necessary data.) Two cases, neither fatal, occurred in Porto Rico; 33 with 4 deaths, in the United States, and the remaining cases in the island of Cuba. The cases constituted 7.91 per thousand of the strength of the Army, and the deaths 0.97 per thousand.

During this year there were reported in Cuba 896 cases and 103 deaths among the white troops, equal to the respective rates of 132.58 and 15.24 per thousand of the strength in Cuba, and among the colored troops 232 cases and 36 deaths, equal to the respective rates of 146.19 and 22.68 per thousand men. The larger rates of the colored troops have already been explained on page 81. The fatal cases among these troops constituted 15.52 per cent of their total number of cases, or 1 death in 6.44 cases, while among the white troops the fatal cases formed only 11.50 per cent of the total number stricken, or 1 death in 6.90 cases.

During the year 1899 there occurred among our troops, regulars and volunteers, 262 cases of yellow fever with 55 deaths, the fatal cases constituting 20.99 per cent of the total number, equivalent to 1 death in 4.76 cases. (One fatal case occurred in the Signal Corps.) Fourteen of the cases, with 3 deaths, were reported from the United States, the others from Cuba. The cases constituted 2.48 per thousand of the strength of the Army, and the deaths 0.52 per thousand.

During this year there were in Cuba 239 cases with 50 deaths among over 18,000 white troops, and only 8 cases with 1 death among over 2,000 colored troops. The admission rates were for the whites 13.26 and for the colored 3.95, while the death rates were for the whites 2.77 and for the colored only 0.49 per thousand of men.

In addition to the outbreaks of yellow fever mentioned under the heading, "Division of Cuba," supra page 168, this disease appeared during the year at Key West, Fla. Rumors of the existence of yellow fever among the citizens of Key West were current in the barracks during the month of August, but these were declared by the health officer to be erroneous until August 31, when he announced officially the existence of 4 unmistakable cases. The post was immediately placed in strict isolation, and arrangements were made for the transfer of the garrison to Fort Terry, Plum Island, near New London, Conn. Embarkation was effected and the troops, 195 officers and men, sailed on the *San Marcos*, of the Mallory line, on September 6. They arrived on the 11th at the New York quarantine, where their baggage was disinfected, and on the 13th they were transferred on the steamer *Meigs* to their new station. Much credit is given to Acting Asst. Surg. R. C. Eve for his earnest work and successful management at this time. Two weeks after the removal from Key West Barracks yellow fever appeared in the detachment of 1 officer and 23 men which had been left behind, and 12 cases, 1 of which proved fatal, were reported from this command.

Several instances of the occurrence of yellow fever on transports were recorded during the year, but in none of these was there any spread of the disease. Thus on the transport *Ingalls*, at Havana, Cuba, a case was discovered at sick call, September 4, 1899, in the person of an electrician. The patient was removed to Las Animas hospital, where he died five days later. On the morning of September 9 symptoms of the disease were developed in a fireman, who also was sent to hospital, where he recovered at the end of five days. The disease in both cases was evidently derived from Havana. The ship was carefully disinfected and no other case occurred.

A case was discovered on the transport *Burnside* on the evening of the day of sailing from Havana, Cuba, November 24, 1899.

Early in November 2 cases were found on the transport *Wright* at Santiago, Cuba. They were immediately transferred to hospital on shore. The ship was disinfected and held in quarantine for five days, after which she proceeded on her voyage.

The transport *McClellan* sailed from Santiago, Cuba, December 23, 1899, and arrived at Brooklyn, N. Y., on the 29th. Immediately after sailing, a sailor, who had been for a week ashore in the city of Santiago, was taken sick with an unmistakable attack of yellow fever. He was placed in absolute isolation, with a special nurse. The visits of the surgeon were made in pajamas and rubber gloves, which were left inside of the outer door of the sick room, and were afterwards soaked in bichloride solution. The patient died on the 27th. The body was removed in sheets soaked in bichloride solution, and was buried at sea. Bed linen and blankets were soaked in a similar solution, and the ward was washed with a strength of 1:500, and afterwards fumigated with sulphur. On arrival at the New York quarantine station the bedding of the hospital and of the hospital corps quarters was disinfected, and the ship again treated with bichloride and fumigation. No other case occurred.

ON THE TREATMENT OF YELLOW FEVER, BY ACTING ASST. SURG. BAT SMITH, YELLOW FEVER HOSPITAL, SANTIAGO BAY, CUBA, SEPTEMBER 19, 1899.

Owing to some controversies which have occurred of late relative to the treatment of yellow fever during this epidemic, I deem it my duty to submit to the chief surgeon my personal views on the subject, as the great majority of the patients treated at this hospital were under my sole care.

A treatment inaugurated by Acting Asst. Surg. E. F. Nunez,[1] and which I said in a former communication deserves due consideration, has found favor with some of the medical officers of this department. The main feature in this treatment seems to be the doctor's great reliance upon and faith in the therapeutical value of salol, with occasional doses of cream of tartar water acidulated with a little lime juice; also irrigation of the bowels with warm water. Lemonade, hot or cold, is also given according to the necessities of the case. Dr. Nunez argues that salol acts as an antiseptic, rendering the stools absolutely odorless. He further argues that by reason of its antiseptic properties it calms the irritation of the stomach and bowels, and thereby reduces the temperature. Cream of tartar acts upon the kidneys and keeps the bowels open.

I watched the results of this treatment with keen interest, sincerely trusting that the doctor's sanguine expectations would be realized, yet I had serious misgivings on account of the nature and composition of the drug salol.

The fact seems to have been overlooked that salol is an irritant to the mucous membranes. It is not soluble in water, and but very slightly soluble in the stomach, but is decomposed by the pancreatic juice into salicylic acid and carbolic acid, the drug being a composition of salicylic acid 60, carbolic acid 40, the antiseptic virtues of the compound being, in all probability, due more to the latter than to the former ingredient. The drug when used in moderate doses evidently has a beneficial effect in soothing the pain in the bowels, which is present in the great majority of cases. The beneficial results obtained by these moderate doses are, on the other hand, more than counterbalanced by the poisonous action of the drug when given so persistently, and in such doses as were administered to the patients during this epidemic regardless of the fact that poisoning by carbolic acid would certainly occur, owing to the decomposition of the drug by the pancreatic juice into its two original ingredients.

According to the best of the European as well as American investigators, the drug is contraindicated in renal inflammation. Especially in the acute form, Lepine and Dujardin Beaumetz condemn the administration of the salicylates in any form when albumen is present. Hesselbach maintains that salol is prone to affect the secreting structure of the kidneys, and deems it exceedingly dangerous when the kidney is diseased. He reports in the Lancet two fatal cases from the use of salol.

If salol be given in doses sufficient to reduce the temperature its poisonous effects are plainly manifest, such as intense headache, restlessness, a profuse and exhausting sweat, delirium; in some cases the mental disturbance lasts for several days, the albumen in the urine increases, and the urine assumes a dark olive-green color. These symptoms were well marked in several cases at this hospital, and two patients had strong and frequent epileptiform convulsions. Again salol has a depressing influence on the circulation, and in yellow fever capillary stagnation is a well-marked feature; while the direct depression of the heart itself decreases the force of the circulation. In this latter view of the action of salol, I am sustained by Kolbe, Danewsky, and Hesselbach. After salol has been administered for any length of time the urine becomes of a dark reddish-brown color, and when nitric acid is added to it the albumen changes to a yellowish-green color; this I have seen mistaken for bile, when in fact it was due to the union of carbolic acid and nitric acid, forming picric acid (bile absent in yellow fever). Salol given in decided doses, whether in yellow fever or any other disease where the kidneys are the seat of an inflammatory process, is prone to bring about renal hemorrhages, and sometimes hemorrhagic cystitis. Considering the decomposition of the drug into its two original ingredients, salicylic and carbolic acids, and the poisonous properties of the two acids, either alone or together, their pernicious action in irritating an already inflamed kidney, bringing about total suppression of urine, the most fatal of all the symptoms in yellow fever, would certainly lead me to believe the drug to be contraindicated in this disease.

Some cases of yellow fever recovered under the salol treatment. They were, however, of a mild type, and would in all probability have passed through the ordeal with little medication, the disease being a self-limited fever. The records of this hospital show that the treatment of severe cases with salol was anything but satisfactory. In this statement I am fully sustained by the commanding officer, Acting Asst. Surg. G. A. McHenry, and by the nurses who administered the medicine.

[1] See Annual Report of the Surgeon General of the Army, June 30, 1899, p. 264.

When put in charge of the wards of this hospital, on June 16, 1899, the commanding officer asked me if I had any particular treatment marked out. I outlined to him, as nearly as possible, my line of treatment; he expressed himself as satisfied, saying that it was identical with that of his friend Surgeon Murray, of the Marine-Hospital Service, whose long experience with the disease certainly entitles his opinion to consideration. The treatment in the majority of cases was as follows: If the patient's condition was such as to permit it, I usually gave him calomel combined with soda, a hot mustard footbath, and a warm sponge bath from head to foot, also an irrigation of the bowels with warm water, after which the patient was covered up in bed, but not too heavily; sometimes a warm lemonade was given to promote the perspiration. If the temperature is high half an hour after giving the calomel and soda, I give the patient about ten grains of phenacetine combined with citrate of caffeine, to be repeated according to the necessities of the case. Phenacetine is a coal-tar product, produced by the action of glacial acetic acid on paraphenetidin, a body obtained from phenol. Experiments go to prove that the fall of the temperature produced by phenacetine is due to a lessened production of animal heat caused by a direct influence of the drug upon the thermogenetic centers, not necessarily accompanied by any distinct alteration of the circulation. By stimulating the heart (when full therapeutical doses are given) and the vasomotor system, the arterial pressure is increased, and the capillary stagnation, which is so pronounced in yellow fever, is partially overcome. Owing to its analgesic properties, phenacetine is a very useful remedy in relieving the intense frontal headache. Its antipyretic effect or rather action is more gradual, more prolonged, and less apt to be attended with disagreeable symptoms than any drug of its class. It does not irritate the stomach and is the safest and most efficient of the coal-tar derivatives. Lepine and Guttman place it at the head of the list. By combining phenacetine with caffeine citrate, phenacetine is placed in the citric-acid group, which renders it less poisonous still.

The combination is made because caffeine stimulates the brain, giving an increase to the urinary secretion and force to the pulse, and elevates the arterial pressure. It is a cardiac stimulant and prevents heart failure; it takes the place of digitalis, which can not be used in yellow fever. It never disagrees with the stomach and acts with promptness; by reason of its action upon the kidneys it in a great measure guards against suppression of urine. There is no danger of the patient's being poisoned by carbolic acid, however large the dose of phenacetine may be, as it contains no phenol, and whatever depressing influence the drug may have is more than counterbalanced by the stimulating properties of the caffeine citrate.

I have always caused the patients to be sponged off at least twice a day with hot water, and the bowels to be irrigated with warm water morning and evening. This relieves the pain and uneasy feeling in the bowels, permitting the patient to rest more easily. Should symptoms of uremic poisoning set in, or the urine become scant, I order a hot bath at once, immersing the patient up to his neck in the water (this year I used half sea and half fresh water) allowing him to remain in the bath for about fifteen minutes, after which he is taken out and wrapped in dry blankets and one-half teacupful of green coffee tea and one ounce of gin is given. This has the effect of causing a profuse perspiration, and in many cases a copious flow of urine was obtained, even after the action of the kidneys had been suppressed. The green coffee tea was suggested to me by acting Asst. Surg. G. A. McHenry, who states that the remedy is extensively used on the Gulf coast, being a favorite one of Surgeon Murray's. As to drinks, some stomachs bear cold drinks well; in other cases, however, warm drinks are more suitable. Under no circumstances, however, should the stomach be overburdened with liquids, hot or cold; whatever is given to the patient should be given in moderate quantities. As to nourishment, if the patient can possibly hold out I give none at all, but if obliged to do so rice water has always been my favorite. Milk will not do, as it is apt to curdle on the stomach and do more harm than good. Many native physicians (Cubans) overburden the stomach with sweet milk; the result is at times an uncontrollable vomiting.

Black vomit I have always (when at all) controlled more easily with the subnitrate of bismuth than with any other remedy at my command, the only difficulty being that the doses generally used are not large enough. In administering this drug to check black vomit, or when it is threatened, not less than one and a-half drachms should be given at a dose, repeated if necessary according to the judgment of the attending physician.

In the stage of convalescence the usual remedies, such as the bitter tonics, wines, etc., may be used. I have always found that milk punches, eggnogs, etc., are of great benefit after the fall of the fever. The fever is a very exhausting one and the patient's vitality is much impaired. Alcohol is a negative article of food, insomuch as it prevents oxidation, and if it does not increase the patient's strength, at least it prevents waste.

Remarks on the above by Acting Asst. Surg. Edward F. Nance.—Acting Asst. Surg. Bat Smith is fully aware that my report on the treatment of yellow fever by salol and bitartrate of potassium and my conclusions drawn from same have been abundantly proven by clinical experience.

The combination of the cream of tartar and lime juice with the salol prevents the irritating action of the latter drug on the intestinal canal and the kindeys, and consequently does away with the contraindications that the doctor sustains. It is possible that salol acts in this disease by neutralizing the specific toxine produced by its microorganism, and thereby counteracting its pathogenic influence on the general system, or else in some unknown way we can not yet explain any more than we can say how mercury brings about the cure of syphilis.

I can assure Dr. Smith that salol has never given rise to intoxication or even any disagreeable after effects in my hands. Is he sure that the convulsions he witnessed in his two cases were not due to uremic poisoning?

The presence of bile in yellow fever is admitted by every ancient and modern writer on this disease, as it can generally be found in all the secretions. To it, as well as to some oxidation product of the coloring matter of the blood, is due the jaundice that characterizes this affection. It is only absent in an advanced stage where the fatty changes have completely obliterated the hepatic cells. Nitric acid will readily detect the presence of bile in the urine by imparting to it a green color.

I can not understand why the doctor criticises the Cuban physicians on the administration of milk during the second stage of yellow fever, since it is almost universally considered as the most eligible article of food in this particular disease, not only on account of its nutritious properties, but also by virtue of its diuretic and soothing effects on the kidneys. I never knew that any Cuban colleague ever recommended sweetened milk in this disease as he asserts. They generally give it mixed with a certain proportion of vichy or Apollinaris water, or diluted one-third or one-half with sterilized water in order to prevent heavy curdling.

Remarks by Maj. W. C. Gorgas, acting chief surgeon, Division of Cuba.—As a member of the yellow-fever commission for the Department of Havana, I have had to see nearly every case of yellow fever that has occurred in this department since January 1, 1899, and in this way have seen the treatment of every physician who has treated yellow fever here this year.

I have seen the phenacetine and caffeine treatment referred to used excessively by one physician. He got no better results than others, and as a consequence I look upon this course with disfavor.

I do not believe that any particular medicine should be urged for any particular symptom.

The tendency of most American physicians and many of the Cubans is toward constant dosing, which I am convinced does a great deal of harm.

From a very extensive experience in the observation of the practice of the best element of the native physicians, I am convinced that the best results are obtained by not using drugs to any great extent for combating the various symptoms.

I do not believe that either of the courses referred to in this paper are the best to be adopted in this disease, and would personally look upon them as being hurtful.

CEREBRO-SPINAL MENINGITIS.

It is doubtful whether all the cases of cerebro-spinal meningitis which occurred in the Army were recorded as such. In 1898, when typhoid fever was epidemic in so many of the camps, some cases of cerebro-spinal meningitis, unless strongly marked in their clinical characteristics, would probably have been recorded as cases of the prevailing disease. During this year there were reported from the Army, regulars and volunteers, 140 cases, with 79 deaths and 9 discharges for disability, and in 1899, 64 cases, with 41 deaths and 3 discharges, giving a total of 204 cases, with 120 deaths. The percentage of fatal cases was therefore 58.8, equivalent to 1 death in 1.7 cases. No special report on this disease was rendered during the past year.

MALARIAL INFECTIONS.

During the two years, 1898 and 1899, 151,021 cases of malarial disease were reported, with 443 deaths and 179 discharges for disability. The cases constituted nearly 30 per cent of the total number

of cases of disease reported—506,018. Intermittent fevers formed 67.8 per cent of the whole number of malarial cases; remittent or continued malarial fevers, 28.3 per cent; pernicious fevers, 0.4 per cent, and cases of malaria cachexia, 3.5 per cent. Of the deaths, 9 were ascribed to intermittent fevers, 151 to remittent or continued malarial fevers, 243 to pernicious fever, and 40 to malarial cachexia. One case in every 844 malarial cases ended in discharge for disability, and 1 in every 341 terminated fatally. Of the cases recorded as intermittents only 1 case in 11,378 had a fatal ending; of the remittent or continued fevers, 1 case in 283; of the pernicious fevers, 37.8 per cent, or 1 case in 2.64 cases, and of the cachexia cases 1 case in every 130 cases.

The admission rate for the Army, regulars and volunteers, in 1898 was 611.78, and in 1899, 574.41 per thousand of strength. In Cuba in 1898 this rate was 1,924.74, or 61.1 per cent of the total number of cases of all diseases taken on the sick report. In 1899 the malarial admission rate among troops in Cuba fell to 1,098.46 per thousand men, or 43.3 per cent of the total number of cases of disease.

In the Army, regulars and volunteers, in 1898, 349 deaths and 63 discharges for disability were occasioned by malarial diseases, giving the respective rates of 2.36 and 0.43 per thousand of strength. This high death rate was due to the gravity of the cases in Cuba, where 14.02 died per thousand of the troops operating on the island. In 1899, 94 deaths and 116 discharges gave the respective rates of 0.89 and 1.10 per thousand of strength, the death rate in Cuba having fallen to 2.50. In the Philippine Islands in 1898 the admission rate was 424.55, and the death rate 1.51 per thousand, and in 1899 these rates were 624.37 and 0.89.

The admission rate among the colored troops in 1898 was 1,086.62, and in 1899, 557.10. The high rate during the former year has already been explained (see p. 81).

From the following tabulation of the admission and death rates the character of the cases reported during the two years may be gathered:

1898—REGULARS AND VOLUNTEERS.

	Army.		In Cuba.		In Porto Rico.		In the Philippines.		In the United States.	
	Admission rate.	Death rate.	Admission rate.	Death rate.	Admission rate.	Death rate.	Admission rate.	Death rate.	Admission rate.	Death rate.
Malarial fever:										
Intermittent	413.67	0.06	1,424.44	0.24	440.89	.....	156.25	.....	365.35	0.06
Remittent or continued	172.98	.91	432.00	5.75	315.83	1.93	265.47	1.21	141.42	.52
Pernicious	3.33	1.25	22.69	7.55	2.63	1.93	.50	.30	2.18	.85
Cachexia	21.80	.14	45.65	.48	13.00	.....	2.32	.....	22.23	.13
Total malarial	611.78	2.36	1,924.78	14.02	772.35	3.86	424.54	1.51	531.18	1.56

1899—REGULARS AND VOLUNTEERS.

Malarial fever:										
Intermittent	391.15	.....	729.94	.....	345.85	.....	388.82	.....	237.84	.....
Remittent or continued	162.98	0.15	332.51	0.25	100.62	.....	216.45	0.20	38.37	0.07
Pernicious	1.42	.55	3.94	1.75	1.07	.....	1.15	.46	.50	.12
Cachexia	18.86	.19	32.07	.50	11.00	.....	17.95	.23	14.17	.02
Total malarial	574.41	.89	1,098.46	2.50	458.54	.....	624.37	.89	290.88	.21

By way of comparison reference may be made on the one hand to the malarial rates of the civil war and on the other to those of the ten years of peace preceding the outbreak of the Spanish-American war. The mean annual admission rate of the white troops of the United States Army during the years of the civil war was 539.77 per thousand of strength with a death rate of 3.92 per thousand. The highest rates were reported for the fiscal year 1865–66 when the admission rate was 886.63 and the death rate 6.27.

The mean annual rates of the ten years of peace, 1888–1897, inclusive were: Admission rate, 87.19; death rate, 0.13.

Few special reports on malarial diseases and their treatment have been received during the year, but in some general reports the subject is discussed incidentally. See for instance, Captain Fauntleroy's report, page 131, and that of Major Hoyt, page 148.

The following special report is submitted:

TWELVE MONTHS' OBSERVATION OF CUBAN MALARIAL FEVERS IN PINAR DEL RIO PROVINCE, BY ACTING ASST. SURG. THOMAS W. JACKSON, UNITED STATES ARMY.

Following the summer campaign of 1898 hundreds of cases of Cuban malarial fever were sent to the hospitals of the great cities of the United States and were there investigated, classified, and studied by clinicians provided with facilities which were necessarily absent from the field hospitals during the campaign. That this material was well utilized for the instruction of students and the medical profession is well known. From the date of formal American occupation, however, the military hospitals in Cuba have been fully able to utilize for the benefit of the medical profession the wealth of material which this tropical country provides.

During the twelve months covered by my observations and those of my colleagues there were treated in the military hospital at Pinar del Rio 1,904 cases of malarial fever. It has been my privilege to examine microscopically over 500 specimens of malarial blood. Every medical officer at this station has had at least one attack of malarial fever, in every case of the æstivo-autumnal variety, in his own person. The excellent literature upon the subject of malarial fevers provided by the Medical Department of the Army has been of untold value to us all in our observations. Particularly valuable have been the classical lectures of Thayer, and the writings of Manson, Cabot, and others. To Capt. G. C. Godfrey, assistant surgeon, and to Drs. William Alden and J. F. Presnell, acting assistant surgeons, I am indebted for courtesy and valuable assistance, and for permission to refer to their cases. The recorded facts and statistics cover the period from February 1, 1899, to February 1, 1900.

My personal observation of Cuban malarial fever began February 20, 1899, at Pinar del Rio, Cuba, at which place all the cases referred to in this paper occurred. The cases were confined to American soldiers, officers, and enlisted men, and civilians attached to the army stationed at this post. The commands stationed here during the dates covered included two battalions of the First Infantry, one squadron of the Seventh Cavalry, one battalion of the Third United States Volunteer Engineers, a company of the United States Volunteer Signal Corps, and a detachment of the Hospital Corps. The service of the cavalry, infantry, and hospital corps troops has been continuous; that of the engineer battalion and the Signal Corps company was confined to the months of February, March, April, and May. Civilian employees of the Quartermaster's Department, engaged in erecting Government buildings, and members of the pack train have been included as soldiers.

Of these commands one only, the First Infantry, took part in the Cuban campaign in the summer of 1898. The infantry, Signal Corps, and Hospital Corps arrived in Cuba in December, 1898, the cavalry in January, and the engineers in February, 1899. In the case of no command, save the infantry, had there been previous exposure to malarial infection. The stations of the cavalry squadron during 1898, previous to its arrival in Cuba in January, 1899, were in Arizona, Huntsville, Ala., and Macon, Ga.; at none of these places did malarial fever invade their camp. The stations of the engineer battalion following its organization at Jefferson Barracks, Mo., in the early summer of 1898 were Lexington, Ky., and Macon, Ga., the latter a winter camp. This command did not suffer from malarial fever to any appreciable extent previous to its arrival in Cuba in February. The Hospital Corps detachment was made up of men previously stationed at Camp Meade, Pa., and Augusta, Ga., and was free from malarial disease up to the time of entering Cuba. Although the First Infantry

undoubtedly brought with it cases of Cuban infection dating back to the Santiago campaign, the regiment was so renovated by recruits and the discharge of men enlisted for the war only that I am of the opinion that less than 10 per cent of the cases of malarial disease which occurred in Pinar del Rio were cases of recurrence due to infection during the Santiago campaign. Of the recurrent Santiago infections the prevailing type was tertian intermittent, and the subjects often referred to a tendency of these attacks to recur after periods of twenty-one or twenty-eight days (or other multiple of seven days). This observation my colleagues and myself are inclined to believe correct. During the intervals the subjects appear to enjoy reasonably good health, and are able to perform their duties.

In my own person I observed the reappearance of æstivo-autumnal parasites in my blood, twenty-eight days after the onset of an attack of remittent fever lasting one week. Upon this occasion the temperature did not reach 100° F., but the presence of parasites persisted for some time in spite of quinine. Following this attack there occurred three outbreaks of the disease with an interim of seven days between attacks. In each outbreak the diagnosis was confirmed microscopically. Since this time several outbreaks have occurred, but the dates apparently bore no such relation to the previous attacks.

For the six months immediately following the arrival of troops at this post, men and officers were quartered in tents, all of which were floored and elevated from 2 to 4 feet above the ground. The camp site was upon a rolling plain, the ground was high and well drained, and distant from any marsh or swamp land. A number of ravines, or arroyas, carried away the surface rain water, and except in rainy weather these ravines were dry. The dews were very heavy. There were no jungles or excessive growths of tropical vegetation in the immediate vicinity of the camp, and the camp site seemed well chosen. Yet it is true that the classical conditions, climate, telluric and atmospheric, which have always been considered necessary for the propagation of malarial fevers were present in some degree at all times. Mosquitos of several varieties were incessantly present in great numbers.

The experiments and demonstrations looking toward the incrimination of the mosquito as the cause of malarial infection, which have been made during the past few years in various parts of the world by numerous observers, have undoubtedly fixed the guilt of many cases of malarial infection upon that insect. There has, however, been no proof adduced that infection does not occur in other ways. The artificial production of the disease in man has been accomplished, it is true, only by inoculation of human malarial blood and by mosquitoes fed upon such blood. All experiments looking toward artificial infection through the digestive and respiratory tracts have failed. Conceding all that is claimed by the most ardent advocates of mosquito infection, it is difficult to persuade ourselves that a malarial epidemic of such proportions as the one observed here in September, during which more than 50 per cent of the residents of the post suffered, could depend solely upon the mosquito for its spreading. (The strength varied from 1,768 in February, 1899, to 393 in January, 1900. The monthly number of admissions for all causes was highest in August, when 600 were recorded in a strength of 1,197; but the largest absolute number of admissions for malarial fever, 443, occurred in September when the mean strength was only 883 men).

No experiments with mosquitoes have been conducted at this post, but I was able upon one occasion to obtain from a mosquito human blood corpuscles containing malarial parasites. This occurred in the case of a colleague who had an attack of æstivo-autumnal fever lasting eight days. One morning some weeks later a mosquito full of blood was captured within the doctor's mosquito canopy. The body of the mosquito was punctured with a needle, the blood expressed upon a cover glass, mounted and examined with the one-twelfth oil immersion lens. Human red blood corpuscles were readily recognized, and, in two or three, small hyaline organisms with ameboid movements were observed. The doctor's temperature was taken and found to be slightly above 99° F., and a specimen of his blood showed similar hyaline forms slightly larger than those obtained from the mosquito, but not in great numbers. The expected paroxysm was averted by the prompt administration of quinine. This experiment was verified by Dr. J. F. Presnell. I can readily understand how this mosquito might have conveyed infection to another individual, and I have no doubt that numbers of such cases occurred.

Patients treated in this hospital for diseases entirely distinct from malarial fever developed it in our wards, having been in the hospital longer than the maximum incubation period. (See table of incubation periods in Thayer's Lectures on the Malarial Fevers, p. 100.) And yet until the possibility of infection being borne by the atmosphere is positively disproven, I am not prepared to lay the entire responsibility upon the mosquito. I do not believe that infection in any of our cases occurred

through drinking water. From the first this entire command has been supplied with freshly-filtered drinking water only. In July the troops began moving into frame and stone buildings situated at the highest point in the town. Coincident with the removal into barracks there was a marked increase in the number of cases of malarial fever, which I believe was in no way associated with the change in quarters, but referable rather to recurrences and the advance of the rainy season, when malaria is notoriously worse in this country. So far as I have been able to observe, the mosquitoes are quite as numerous in the barracks as in the old camp, but the facilities for protection against them are much greater. All the troops were early provided with canopies of mosquito netting, but, obviously, these protect only during that portion of the twenty-four hours spent in bed, viz, about one-third of the time.

An effort has been made to destroy the breeding places of mosquitoes by drainage of near-by swampy land and the spreading of petroleum (kerosene) upon the surface of all standing water in pools, barrels, or other reservoirs; but I am inclined to coincide with the conclusion of Celli and Casagrandi,[1] that "while the problem of destroying mosquitoes is experimentally solvable, it will practically be so only when economic interest desires it." As they point out, the "opportune season for killing the larvæ is in the winter, when they are least in number in the waters, and new generations are not born." But in Cuba there is no winter. The destruction of the mosquito in Cuba is a problem not likely to be easily or immediately solved.

During the spring months the prevailing type of malarial fever at this station was the intermittent, nearly always of the tertian variety, and invariably associated with the presence of the benign tertian organism in the blood. Naturally quotidian fevers were frequently observed, but were always found to be due to several families of the tertian organism sporulating upon successive days. The quotidian fevers frequently changed to the pure tertian type and were promptly cured after the parasites were reduced to a single group of the tertian variety by quinine properly given.

I have at no time observed quartan fever or its parasite.

As the season advanced there was a progressive increase in the number of cases of continued malarial fever, and during the later months of the rainy season at least 50 per cent of the cases were, in my judgment, of the continued or remittent variety.

Malarial fever, as it occurs in Cuba, naturally divides itself into two classes, the mild and the severe. It is also divided clinically into two great classes, the intermittent and the continued or remittent. Generally speaking, the intermittent fevers are benign and mild, and the continued or remittent are severe and grave. In regard to the use of the term remittent, Manson[2] writes as follows: "Since it has been found that what was designated remittent fever is produced by quartan, tertian, and quotidian parasites—the fact of intermittency or remittency being more or less a matter of accident—it has been considered advisable to expunge the term remittent fever as indicative of a distinct species of plasmodium disease. * * * The intermittency or remittency of any given fever depends in great measure on the simultaneousness or the reverse of the maturation of the crowd of parasites giving rise to it. If all the parasites present are of nearly the same age, they mature approximately simultaneously and we have an intermittent; if they are of different ages they mature at different times scattered over the twenty-four hours and we have what is known as a remittent." Thayer[3] classifies malarial fevers, safely and conservatively, as: (1) The regularly intermittent fevers, (*a*) tertian fever (*b*) quartan fever, (caused by benign parasites). (2) The more irregular fevers, æstivo-autumnal fevers (caused by malignant parasites). This classification corresponds with the natural division into benign and grave fevers given above, and holds good for Cuban malarial fevers.

Of the regularly intermittent fevers it may be said that they differ not at all or very little from the type familiar to practitioners in the United States, and they may therefore be dismissed from this consideration with brief remark. As intimated above, the regularly intermittent malarial fevers are more prevalent in the spring and winter, but are to be observed at all seasons in Cuba and probably constitute 50 per cent of the total number of malarial fever cases.

There is but one absolute and accurate method of diagnosis, viz, the microscopical examination of a specimen of the patient's blood. All other methods are fraught with elements of error. The microscopic method is exact, accurate, and invariable. The plasmodium malariæ is always present in every case of intermittent fever and so readily found that the objection that an elaborate technical knowledge is necessary can not be advanced. Any medical man with a general knowledge of the use of the

[1] Therapeutic Gazette, October 15, 1899: "Destruction of the mosquito," etc. A. Celli and O. Casagrandi.

[2] Tropical Diseases, p. 37.

[3] W. S. Thayer, Lectures on the Malarial Fevers.

microscope can acquire in a short time, with the aid of one of the several excellent illustrated works upon diagnosis, the necessary technical skill. A knowledge of staining is not essential, as the best results are obtained with unstained blood. The prevalent idea that the previous administration of quinine makes useless a search for the plasmodium is not in my experience entirely correct. The presence of moribund or fragmented malarial organism in the blood plasma and of pigment bearing leucocytes and deformed red corpuscles is of great value and may be observed for some time after quinine has been administered; and, indeed, a certain number of motile organisms often persist in the blood for a short time after sufficient quinine has been given to terminate the fever.

Next in value to the microscopic method comes the therapeutic method of diagnosis by quinine. The dictum of Osler[1] that "an intermittent fever which resists quinine is not of malarial origin," laid down as a clinical rule for practitioners in the United States north of Mason and Dixon's line, holds as good for Cuba, but the qualifying word "intermittent" must be borne in mind. I shall presently submit charts of cases of continued malarial fever which resisted quinine in the most obstinate manner. A possible source of error lies in the method of administration of the drug. In my opinion, quinine should, whenever possible, be given in solution or capsules to insure its absorption. I have repeatedly recovered from the stools of patients quinine tablets of various makes and gelatine-coated pills which were readily compressible and apparently fresh. It is but fair to state that in every such case digestive derangement of some form was present, but it is well known that such derangement is fairly constant in all malarial fevers. Another element of error lies in the use of insufficient doses. The drug should be rapidly pushed to cinchonism, a condition caused in different individuals by widely variable doses.

The microscopic and therapeutic methods of diagnosis of intermittent malarial fevers are the only methods worthy of consideration. When the microscopic method is not available the therapeutic is most useful. Scientifically the therapeutic diagnosis should rather be a confirmative test to be used after the microscopic. If made use of first it invalidates to a certain extent the microscopic, but, as pointed out above, not entirely.

Clinically, intermittent malarial fevers are of three varieties: The tertian, most prevalent of all, in which the paroxysm recurs at intervals of forty-eight hours; the quartan, in which the paroxysm recurs at intervals of seventy-two hours, and the quotidian, in which the paroxysm recurs at intervals of twenty-four hours. It is doubtful whether a benign quotidian fever ever depends upon a special variety of the parasite, as do the tertian and quartan types. Quotidian recurrence can be very readily and perfectly explained by the fact of infection by several generations of either tertian or quartan organisms which sporulate upon successive days, thus giving rise to the twenty-four hours paroxysms. Most observers accept this explanation. Of the tertian organisms but two sets are required to produce quotidian paroxysms. I have invariably observed this combination in the cases of quotidian intermittent at this hospital. In the case of the quartan organism three groups of parasites sporulating upon successive days would produce quotidian paroxysms, but as no cases of quartan infection have been observed at this hospital, I have no personal experience with this form of quotidian fever. It should also be borne in mind that continued fever due to multiple infections of the tertian (benign) organism is theoretically possible, and Thayer[2] has observed one or two such cases. It is certainly a rare manifestation of tertian infection, as the tertian organisms show a tendency to arrange themselves in sharply defined groups.

The paroxysm of the regularly intermittent fevers usually consists of three stages—chill, fever, and sweat. Of 352 cases observed by Thayer at Johns Hopkins Hospital, 97.5 per cent had chills or chilly sensations. In the Pinar del Rio cases the percentage giving histories of chills is certainly smaller, but patients who upon first questioning do not recall a cold stage very frequently correct their statements. The chill may vary from the merest shivering sensation to a pronounced rigor. In those cases without prodromal malaise the chill is more frequently severe.

The diagnosis of the irregular malarial fevers is rendered less easy than that of benign malaria by reason of certain facts connected with the life cycle of the æstivo-autumnal parasite. As the young parasites increase in size they, with the red blood cells which contain them, show a decided disposition to retire from the peripheral circulation. As the hyaline forms of this parasite begin to accumulate pigment they become less and less numerous in the peripheral circulation and during the stage immediately preceding sporulation, and during that process they are but rarely to be

[1] N. Y. Med. Journal, Nov. 4, 1899, p. 675.
[2] Thayer, Lectures on the Malarial Fevers, p. 116.

found there. On the contrary, they are present in immense numbers in the blood of the spleen during and preceding the sporulating period. Although aspiration of the spleen to secure blood specimens is probably justifiable, occasionally it is certainly attended with greater risk than the needle prick for the extraction of a drop of blood from the ear or finger. I have in a few cases observed sporulation of the æstivo-autumnal parasite in blood obtained from the ear, but it is by no means a common observation. It is owing to this tendency of the æstivo-autumnal parasite to disappear from the surface circulation as it approaches sporulation that there is such difficulty in determining the exact time of its cycle. There is considerable difference of opinion upon this point, and it is doubtless a less constant period than that of the benign parasite. Thayer[1] believes that it may vary from twenty-four to forty-eight hours. Few observers have laid much stress upon the possibility of recognizing the youngest forms of the parasite (i. e., immediately following sporulation), but I believe the organism in this stage is more frequently to be recognized free in the blood plasma than is generally supposed. The similarity of the parasite in this youngest stage to particles of hæmoconien (Miller's blood dust) is to be borne in mind. It is sometimes difficult to distinguish between these bodies, particularly as they are very apt to coexist in the blood following sporulation, but careful discrimination will reveal that the parasite in this stage is endowed with a certain degree of motility, while the movement of the particles of blood dust is purely a molecular dancing movement. Moving currents of blood sometimes give the particles of hæmoconien the appearance of motility.

The size of the red blood cell containing a partly grown parasite of the æstivo-autumnal variety is almost invariably smaller than its fellows, while the partly or full grown benign parasite causes the corpuscle containing it to appear swollen and larger than its fellows. This is a point of differentiation which I deem of considerable value and more to be relied upon than the so-called "brassy" color of the corpuscle, caused by the invasion of the malignant parasite. This change in color is, however, usually apparent.

The presence of crescents and ovoids is of course indicative solely of the malignant parasite, but these bodies do not occur in the earliest stage of æstivo-autumnal fever, and when present are detected with some difficulty in the unstained specimen.

Flagellation is to be observed in both the benign and malignant parasites, and is therefore of little use in differentiation between them. A recent article by Craig,[2] detailing his observations of the flagellate forms of both varieties, is interesting in this connection.

A microscopic evidence of malarial disease not likely to be esteemed is the finding of pigment-bearing leucocytes in the blood. Often when the time of the examination is unfavorable for the discovery of the parasite itself it is possible thereby to make oneself reasonably sure of the recent presence of parasites in the blood, and thus assured perseverance will usually lead to the later detection of the parasite. Pigment-bearing leucocytes are so rare in all diseases other than malarial that their presence may be considered as almost diagnostic. Naturally this knowledge is of greatest value in the irregular fevers.

I believe all observers will agree that a simplification of terms descriptive of the various forms of malarial fever is highly desirable. To this end the elimination of terms which are really descriptive of symptoms of intercurrent diseases will greatly contribute. The possibility of the coexistence of malarial fever and some other distinct disease in the same individual must be admitted. My observation has included many such cases. It seems proper not to confuse physical signs and symptoms of distinct diseases occurring in the individual at the same time. Often the presence of leucocytosis discovered in search for parasites leads to the detection of some other disease. Ordinarily the blood of a malarial-fever patient does not show an increase of leucocytes.

Æstivo-autumnal malarial fever may be properly classified into types, in accordance with the predominance of certain symptoms, and in nearly every case it may be shown that these symptoms are evidences of involvement of special organs. Thus headache and delirium, intestinal pain and diarrhea, may indicate that the brain and its coverings, or the intestines, are being especially invaded by the parasites. In this manner we may use the terms descriptive of types, gastralgic, cardialgic, comatose, hemorrhagic, bilious, etc. I have seen no type of fever which could be properly classified as cardialgic or pneumonic, although I have observed intercurrent malarial fever and heart disease, and intercurrent malarial fever and pneumonia.

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[1] Lectures on the Malarial Fevers, p. 69.

[2] Observations on Flagellated Malarial Plasmodia. Descriptive of two varieties. C. F. Craig. N. Y. Medical Journal, December 23, 1899.

The patient suffering from an attack of æstivo-autumnal malarial fever of moderate severity may present the following objective and subjective symptoms: Malaise and anorexia for twenty-four hours, followed by an initial chill (which may not be repeated), a coated tongue, which is almost invariably increased in all its dimensions and shows the indentations of the teeth upon its borders, headache, nausea, vomiting, diarrhea, suffusion of the eyes, an icteric condition of skin and sclerotics, pain in the back and limbs, and epistaxis. In short, the picture may simulate closely the clinical picture of many of the acute infectious diseases, including yellow fever and typhoid. Albumen may be present in the urine, rarely, however, during the first days. The rise of temperature is usually gradual, compared with the rise in the regularly intermittent fevers, and may begin previously to the chilly stage, if there be one. At the end of twenty-four hours a decline in temperature is usually noted, and if the infection be a mild one or promptly recognized and treated, a second rise may not occur. Both onset and decline of fever in the æstivo-autumnal paroxysms are less sudden than in the regularly intermittent variety. From this point the disease may take on one of several types. If the infection be one of a single crowd of parasites of approximately the same age, and if sufficient quinine properly timed, either by design or accident, be administered, the initial paroxysm may be the only one. Or if the quinine be so administered as to destroy all the parasites but a few, and successive doses complete the destruction, the temperature may hover slightly above the normal point for a day or so. Cases of these types are not uncommon. The temperature curve may show remissions or even intermissions at intervals of from twenty-four to forty-eight hours, either with or without the classical accompaniments of chill and sweat; but in my Cuban experience such regular recurrences of paroxysms in fevers due to æstivo-autumnal parasites have been rare indeed, although charts have been made to show the thermometer readings every two or four hours. The Italian observers and others have apparently shown a definite periodicity in certain of these intermittents and remittents. If these observations are correct, I should be inclined to look elsewhere than to the parasites for the cause of this periodicity. I am of the opinion, and my opinion is strengthened by my microscopic observations, that the æstivo-autumnal parasite is, approximately, a quotidian parasite, but infection with multiple generations, sporulating at all times of the twenty-four hours, is so overwhelmingly the rule that one can readily understand why these fevers are irregular or continued rather than intermittents or remittents. Fevers of the first-described type, viz, those terminating at the end of twenty-four hours, are not infrequently mistaken for benign tertian infections. The true character of the infection, however, may be revealed by the microscope.

If at the end of the first period the fever becomes continuous, the group of symptoms commonly described as typhoid gradually appear, and the most acute observer is frequently long in doubt as to the true nature of the fever unless he has recourse to the diagnostic microscope.

The clinical picture of a severe case of continued malarial fever is startlingly like that of enteric fever. Here the therapeutic diagnosis by quinine often fails, but the microscope and the typhoid serum test remain our faithful servants. It is far from my wish to throw the slightest discredit upon the other methods of differential diagnosis. My desire is to emphasize the great similarity of the clinical pictures of enteric fever and continued malarial fever of the æstivo-autumnal variety and the possibility of absolute diagnosis. Fortunately cases of the last-described type do not constitute more than about 5 per cent of the whole, or 1 in 20. It should be borne in mind that the æstivo-autumnal infections run the gamut of severity, and that very mild cases as well as very severe ones may occur. There is danger that the mild infections may receive inadequate treatment and may assume pernicious types in later manifestations.

The occurrence of combined infections has already been referred to. Among the combinations observed in this series were those of malarial fever with dysentery, typhoid, tuberculosis (pulmonary), syphilis, and venereal diseases of all kinds, and various skin diseases.

One of the most interesting sequels of æstivo-autumnal malarial infection observed was a case of double retinitis pigmentosa (so pronounced after repeated ophthalmoscopic examinations) in an individual whose previous history was entirely negative.

It is frequently difficult to decide whether or not dysenteries, apparently of the simple catarrhal variety which occur coincidently with malarial fever, are in any way referable to the latter disease. Their apparent cure in certain cases by quinine strongly points to a relation between the conditions. The ambulatory fever cases are most apt to present this symptom.

No case of amœbic dysentery or liver abscess has been observed at Pinar del Rio.

The possibility of confusing cases of insolation with malarial fever is to be borne in mind.

A febrile malaria exists probably more frequently than is generally supposed, particularly in subjects who have experienced several attacks of malarial fever. It probably never occurs except as a sequel of the latter. Its diagnosis can only be made microscopically. I have observed a number of cases, in all of which the parasite was of the æstivo-autumnal variety. The symptoms are malaise, headache, nausea, and sometimes vomiting, occurring with an abortive chill or sweat.

Naturally malarial cachexia has been frequently observed in the subjects of repeated æstivo-autumnal infections. It is almost invariably associated with a secondary anæmia, often rather profound in degree. It is in this condition that administration of arsenic is valuable. I have found arsenic utterly valueless in the treatment of acute malarial fevers. The experiment of administering Fowler's solution in two and three minim doses three times a day to each man in the command was tried at this post, and at one other in this province, during the spring months of 1899. This procedure was based upon the alleged prophylactic and curative value of arsenic in the malarial fevers. It is only necessary to refer to the increased number of cases during the following months to show its utter uselessness in preventing malarial infection.

Contrary to the experience of recent writers, the urine in our malarial fever cases rarely contained albumen. Even in our gravest cases its occurrence was exceptional. Hæmoglobinuria was observed but infrequently, and never as a post-malarial affection. No case due to quinine administration was observed. The spleen was usually demonstrable in cases lasting four or five days, and, in some instances, was the seat of considerable pain. Malarial hepatitis was observed in one case of recurring æstivo-autumnal fever. Jaundice of a moderate degree was rather frequently observed, but severe catarrhal jaundice was a much less frequent complication than in a similar number of typhoid fever cases observed in the military camps in the United States in 1898. The jaundice in malarial fever cases is in proportion to the amount of red-cell destruction, but, as Thayer points out, it is due to an excessive production of bile, the result of the effort on the part of the liver to dispose of the excessive amount of pigment in that organ.

The opportunities for observation of pathological conditions post-mortem have been extremely limited, as no autopsy has been made. In the series of 1,904 cases upon which this report is based but 4 deaths occurred. Of these 4 fatal cases but 1 occurred in my own service. The prominent symptoms in these cases are noted below.

I. T. E.; pernicious malarial fever closely simulating typhoid fever, but Widal test negative. Malarial parasites (æstivo-autumnal) present in variety of forms in the blood on admission and throughout the disease. Gastric crises and profound sweats, at which times large numbers of young organisms were found. Spleen greatly enlarged. Urine acid; 1022; no albumen. Violent delirium, coma; death on eighteenth day.

II. M. J.; pernicious malarial fever (æstivo-autumnal parasite), duration 4 days; high temperature, wild delirium, profuse sweating, coma 36 hours, ending in death.

III. W. W.; pernicious malarial fever (æstivo-autumnal parasite), duration 18 days, high temperature, no delirium; general purpura appeared upon ninth day, bleeding from gums, left hemiplegia, coma (brief), preceding death.

IV. W. B.; pernicious malarial fever (æstivo-autumnal parasite), two attacks, duration of first 13 days. Second attack, after interim of 8 days, terminated fatally at end of a week; a few purpuric spots observed; coma 12 hours; death. This man served through the campaign in the Philippines without illness. Upon reenlisting he came to Cuba and was immediately taken ill with malarial fever.

It will be seen that all of the fatal cases developed coma, and that cases III and IV were distinctly hemorrhagic, case III being a well marked instance of cerebral hemorrhage.

When we consider the death rate of this series, less than one-fourth of one per cent of all cases, and remember that these cases were all cases of West Indian malarial fever, reputed world-wide to be peculiarly pernicious, we are convinced more forcibly than ever before of the inaccuracy and untruthfulness of the statistics relating to malarial fevers in every city of the United States. Truly this reflects most discreditably upon the diagnostic acumen and abilities of the physicians of the United States, and we may reasonably expect to see a wonderful decrease in the total number of malarial fever cases, and of deaths from the same, in future public health statististics as the scales fall from the eyes of the men who have made these statistics untruthful and misleading.

There remains to be considered the important matter of treatment. The observation of a large number of cases within a year has brought home to me certain convictions. First of all, I am convinced that quinine is a specific in the treatment of malarial fevers of all kinds. This statement may seem to be out of harmony with

some of my expressions in the foregoing pages, but in reality it is not so. I have stated and shown by charts that certain fevers, undoubtedly uncomplicated malarial fevers, withstand for a long time very heavy doses of quinine. But I have not intimated, I believe, that these cases were not ameliorated, kept within control, and eventually cured by the drug. That many more than four deaths would have occurred in the 1,900 cases referred to without the heroic use of quinine, I am morally certain. The fact that some of these cases have been able to take without perceptible ill effect as much as a thousand grains of quinine in a short time and have eventually recovered, and the fact that for one case which persists for a time in spite of quinine twenty perhaps will be immediately cured, constitute for me evidence entirely convincing as to the specificity of quinine.

Considerations of the utmost importance are the time and method of administration and the dosage.

The proper time to administer quinine is at a period sufficiently in advance of the sporulation of the parasites to assure the absorption of the drug into the blood, and its presence there in solution when a sporulation occurs. It is generally agreed by observers that the parasite within the red blood cell is protected to a certain degree, varying with its stage of development and the degree of degeneration of the red corpuscle, and that it is most vulnerable to the destructive action of quinine when free in the plasma immediately after segmentation and sporulation. The important things to know, then, are the length of time elapsing between the administration of the quinine and its presence in solution in the blood and the exact time of sporulation. The former naturally depends upon the method of administration, whether by mouth or needle, and if by mouth upon the solubility of the drug and the activity of absorption in the individual. The approximate time of sporulation of the benign parasites, tertian and quartan, is fortunately known after the first paroxysm. I consider the method of administering a dose of quinine by the mouth two hours before, one hour before, and during the paroxysm, and a fourth dose an hour later, a rational and effective method in the regularly intermittent (benign) infections.

In the infections of the malignant (æstivo-autumnal) parasite, rational treatment is rendered more difficult by the uncertainty of the time of sporulation of any given group, and the infrequency of infection by a single group. As has been pointed out, these cases are usually cases of multiple infection, and groups are probably sporulating throughout the entire twenty-four hours, and parasites sporulating are but rarely perceptible in the peripheral circulation. The indication, therefore, would appear to be to keep the patient's blood by means of quinine in a condition as toxic as possible to the young organisms as they escape into the plasm after sporulation. This can only be accomplished by the exhibition of quinine at rather frequent intervals during the entire twenty-four hours. If the case be distinctly paroxysmal we may be guided by the fact to give larger doses before and at the time of the paroxysms. I believe a frequent cause of failure is the omission of quinine exhibition during the night. In a general way I believe it is well to give quinine at intervals of three hours throughout the twenty-four.

Quinine may be introduced into the circulation by several routes, viz, through the digestive tract by mouth or rectum; through the skin by inunction or hypodermatic injection, and by direct injection of a solution into the veins. Theoretically, the direct injection into the veins seems to be the most rational method, overcoming the possibility of failure of absorption when given by mouth and when thrown directly into the tissues. I have never made use of this method, but shall certainly do so in severe cases hereafter if the opportunity presents. For practical purposes the methods of inunction and rectal administration may be disregarded. In most cases quinine given by the mouth in acidulated solution or capsules will ultimately destroy the malarial parasites in the blood provided the stomach remains tolerant. When the stomach loses its tolerance before the destruction of parasites is complete, resort must be had to hypodermatic or intravenous injection. I believe the administration of ginger, powdered in capsules with quinine, or in syrup added to solutions of quinine, or in the form of ginger ale, assists materially in preserving the tone and tolerance of the stomach.

As to dosage I am guided by effects, always bearing in mind the points relative to time set forth above. Microscopic and thermometric observations are better indices of the effect of quinine in malarial fevers than the subjective sensations of the patient. In a general way I may say that I have found 2, 3, and 5 grain doses of quinine by the mouth, insufficient in the Cuban malarial fevers; I prefer doses of 10, 12, or 15 grains. If resort must be had to the hypodermatic method certain precautions are indispensable. A complete and sterile solution not extremely concentrated, an aseptic instrument, and an aseptic technique will exclude the possibility of abscess formation. If for any reason the solution is not absorbed, necrosis of the

soft tissues containing it may occur, but these pseudo-abscesses will be found not to contain pus. The bimuriate of quinine and urea, by reason of its complete solubility, has given the best results. A syringe larger than the ordinary hypodermatic syringe should be used and the needle should penetrate to the deeper tissues of the back or buttock. The arm is not a favorable site for these injections. An antitoxin syringe two-thirds full of a solution of 10 grains of the bimuriate of quinine and urea may be used. I have found this dose, repeated according to effect, about the proper one. The greatest care to secure asepsis in preparing the skin, solution, syringe, and the hands of the operator must be observed if abscesses are to be avoided. The injections are frequently followed by pain, which sometimes persists for several hours. The use of antipyretics and analgesics, such as phenacetin and acetanalid in various combinations, undoubtedly adds greatly to the comfort of the patient, and under ordinary circumstances I can see no good reason why they should be withheld.

The various conditions of asthenia, hyperpyroxia, diarrhea, delirium, etc., should be met with appropriate treatment as they arise. It seems needless to add that the conservation of the patient's vital forces and strength by proper stimulation, nourishment, and nursing is of as great importance in malarial as in other fevers.

DENGUE.

At Columbia Barracks, Quemados, Cuba, early in the second week of September, 1899, several cases of fever were reported in one of the companies of the Eighth Infantry. The disease spread from this to adjoining companies until it became epidemic. On October 10 the troop barracks of the Seventh Cavalry became invaded, that nearest to the infantry camp being first infected. The daily sick report of this regiment rose from 52, on October 10, to 108 on October 18. The artillery troops became affected October 23, and in this command the maximum was reached on the 28th of the same month. On October 18 the post report showed a maximum of 291 cases of this fever under treatment.

The disease was carefully studied by Acting Asst. Surg. Najeeb M. Saleeby. Thermographs and histories of 150 of the cases were recorded, and to his report were added many diagrams showing the relative positions of the various barrack buildings and the curves of prevalence of the disease in each. Dr. Saleeby recognized a febrile disease of one paroxysm declining to normal on the third or fourth day, but in many of the cases having a second and milder paroxysm which prolonged the return to the normal until about the sixth or seventh day. Quinine had no curative influence, and microscopical examination of the blood demonstrated the absence of the malarial parasite. The disease was distinguished from yellow fever by its benign character, no death having occurred, and by the absence of albumen in the urine, jaundice, and internal hemorrhages. Dr. Saleeby rejected the suggestion that his cases were cases of dengue, and held that they were either mild cases of yellow fever or cases of a peculiar and hitherto undescribed fever (one of the calenturas of the Cubans), which probably has an acclimating influence and may hereafter be shown to be protective against attacks of yellow fever. In these views he is not sustained by Capt. A. N. Stark, assistant surgeon, United States Army, the post surgeon, who was himself one of the sufferers from the disease and who regarded his attack as one of dengue. Maj. Jefferson R. Kean, surgeon, United States Volunteers, chief surgeon Department of Havana and Pinar del Rio, also regarded the febrile outbreak as one of dengue, and reported that about 380 of the cases borne during October on the sick report of Columbia Barracks as malarial fevers involved errors of diagnosis. He considered such a sudden and enormous increase in malarial prevalence in the absence of any altered condition

of the sanitary surroundings to be highly improbable, and from the character of the cases regarded the outbreak as an epidemic of dengue. He attributed these errors to the absence of systematic blood examinations on admission, and to the apparent response of the fever to the therapeutic test. In tropical malaria quinine often requires four or five days to bring the temperature down, and as in dengue the temperature falls to normal in about this time, the specific treatment is credited with the result. Nevertheless, in discussing Dr. Saleeby's paper, Major Kean agreed with the writer that our nosological table does not contain all the fevers of the Tropics. He continued:

The short mild continued fever of about a week's duration, with a descending temperature curve from the first or second day, is an old acquaintance. Whether this is an acclimatizing, i. e., a very mild sporadic form of yellow fever, is an interesting and important subject for investigation. Dr. H. R. Carter, Marine-Hospital Service, recently in conversation advanced the following facts, which are suggestive in this connection: All quarantine authorities agree that ten years' residence in Havana entitles a man to be considered immune; that is, that in that time he will certainly have had yellow fever or an immunizing fever. The Spanish immigration—nonmilitary—for years past has been on an average 15,000 a year. Of these, by a moderate estimate, 5,000 make their home in Havana. Approximately 5,000 children are born in Havana each year. Supposing that half of these die before they reach the age of 10, we have 2,500 a year to acquire immunity in the same way that the Spaniards do. Thus we should have 7,500 cases a year of immunizing (yellow) fever. The average annual civilian death rate in Havana from yellow fever is 210, which, with a death rate of, say, 30 per cent, would give 700 cases of clinically recognized yellow fever a year. Thus we would have left 6,800 persons a year who acquire immunity through fevers not to be recognized as yellow fever in the home of that disease.

The following extracts from Dr. Saleeby's report may be of interest:

General description.—The disease is ushered in by the same variety of initial symptoms as the other specific fevers. But two modes of onset seemed to distinctly prevail and very eminently represent the manner of the declaration of the disease. In the first class of cases the attack sets in with headache and a slight rise of temperature. These gradually and progressively increase in intensity. The headache becomes very severe and frontal, and is soon followed by intense general muscular pains in the back, loins, and lower extremities. They are rheumatic and grippe-like in character and are very distressing. As the temperature rises slight chills or chilly feelings are felt at intervals, alternating with feverishness. If the temperature rise rapidly, a severe chill may occur. The fever continues to increase with or without a slight interruption, and generally attains its maximum height on the second day. The temperature then ranges from 102° F. to 104° F. and the pulse from 80 to 104, febrile and full. The headache and the muscular pains already intense become excessive. The patient is completely prostrated in a severe case. Delirium may occur. With the headache there is dizziness, insomnia, and restlessness. The eyes are congested and ache, and the face is flushed. There is complete anorexia and nausea and sometimes vomiting. The bowels are sometimes normal, but often present diarrhea or constipation. Diarrhea is more general than constipation, and soreness of the abdomen is not uncommon. This condition may be maintained during the third, and less frequently the fourth day of the disease, but generally the fever begins to decline after the second day and reaches normal between the fourth and seventh day. With the decline of the fever all the other symptoms abate. The nausea and vomiting are the first to cease. The headache holds closer relation to the temperature than the muscular pains, and generally lasts a day or two after the termination of the fever, while the muscular soreness continues longer. During convalescence bowel disturbances are not rare.

In a minority of the cases the maximum temperature is attained on the first, the decline begins on the second, and the fever may terminate as early as the third day. In another minority, consisting of about one-third of all the cases, a second rise of the fever follows after a brief intermission of less than one day. With this secondary rise the same symptoms occur, but they are shorter in duration and milder in character than during the first paroxysm. The occurrence of the second paroxysm does not necessarily indicate a severe attack.

In the second class of cases the onset is very sudden and violent. The attack

starts directly with a severe chill, which is immediately followed by excessive headache and very intense muscular pains. The maximum temperature is generally attained on the first day. There is immediate prostration and severe gastric disturbance.

The temperature chart represents either one paroxysm of fever or two paroxysms separated by a brief intermission. About two-thirds of the cases present one paroxysm only. These prevail during the first period of the epidemic and at every outbreak. The first paroxysm indicates a continuous run of fever for from three to seven days. It is made up of two parts—a rapid rise, representing the stage of development, and a slow, gradual decline. In case the maximum temperature is reached on the third or fourth day, or the height of the fever be maintained more than one day, the stage of fastigium would then be represented by an intermediate oscillating curve.

The rise is completed either on the first or the second day. In the first case it is a straight, nearly vertical line, and in the second it is marked by a slight interruption after the first day. The remission after the second day is generally marked. The decline is nearly always by lysis. It is either a regular step-ladder-like fall or a more or less gradual descent. To linger at 100° for one day or so is not an uncommon irregularity. Another rare interruption is caused by a secondary rise of the temperature on the fourth or fifth day. This may reach the level of the former rise and then end by crisis, or fall short of that, and then descend a steeper incline than it would have done otherwise.

In 63 out of 159 cases represented by the charts the fever returned after a short intermission and exhibited a second paroxysm. The intermission was generally less than one day, and seldom exceeded this limit. The temperature then may remain at normal or descend 1° or more below that, chiefly when the administration of quinine is free and prolonged. The second paroxysm might be of a remittent or continued type and resemble the first, or it might be intermittent and variable. The temperature rises to 100° and 101°, and its duration varies from one to four days.

Prognosis.—In mild cases some of the patients kept up and did not take to bed, and resumed their duties three days after the fever ended. Convalescence was rapid as a rule; complications were very rare; no death occurred.

Diagnosis.—This disease simulates remittent malaria and dengue. The former was presumed at the first outbreak, but the nature of the disease developed quickly and the difference was soon realized. Quinine utterly failed, except in increasing the distress of the patients, and no haematozoa were found in the blood. The similarity to dengue was greater on account of the severity and nature of the pains, but against this I urge the following facts: The infection seemed to distinctly arise from the ground soil of a certain locality and spread out by contiguity. The epidemic did not spread as such outside the limits of our camp, though the disease evidently existed in the vicinity and in Havana. No epidemic of dengue existed at the time in this province. The disease was preeminently a fever of one paroxysm; and in case there were two paroxysms the second followed immediately after a real intermission of less than one day's duration. The disease did not affect the joints at all, and was not accompanied by any distinctive general eruption. The eruptions observed simulated the primary eruption of dengue and only occurred in about 7 per cent of my cases. The second distinctive general eruption of dengue was never seen so far as I know. Not convinced, however, that the disease was either dengue or yellow fever, I adopted for the time being the term "simple continued fever," in recognition of its well-defined type.

Lately I interviewed some of the eminent physicians of Havana on this subject. They all remarked the close similarity the charts present to yellow fever, but on account of the absence of albumen in the urine and jaundice, and on account of the benignity of the epidemic, they pronounced them different and separate. Some called this fever the "acclimation fever of Cuba," and claimed that it gives immunity from yellow fever. Others called it "fievre inflammatoire," and claimed that the chief difference between this and yellow fever is the absence of albumen in the urine. Other indefinite terms like "infectious fever" and "gastric fever" were suggested. Dr. Tomas V. Coronado, who is a very reliable authority on the fevers of Cuba, tells me that what some call inflammatory fever is really yellow fever. He holds that dengue might occur in an epidemic form without eruption, but that it does not exist at the present time in Cuba. He also affirms that the character of this epidemic and the manner of its extension strongly contraindicate dengue, and tends to ally it with yellow fever.

Lacking the confirmatory evidences on the question, I remain undecided as to the real diagnosis. But, in considering the views and different statements of the native physicians on yellow fever and other unclassified diseases they describe, I simply

remark that either there exists in Cuba an endemic disease that holds a close similarity to yellow fever, and which has not yet been recognized and differentiated, or that a benign form of yellow fever may exist.

Treatment.—The disease having been benign, the treatment was chiefly symptomatic, and was directed mainly to relieve the pain and reduce the temperature.

FEVERS OF UNDETERMINED CAUSATION.

Admission rates per thousand of strength of the Army, regulars and volunteers, for the calendar years 1898 and 1899.

Year.	Army.	Cuba.	Porto Rico.	Pacific islands.	United States.
1898	28.09	76.57	45.85	59.96	21.59
1899	25.48	41.75	12.07	37.04	8.34

In 1898, 4,152 cases with 1 death, and in 1899, 2,689 cases, none fatal, were recorded, giving the rates of admission shown in the above tabulation. In general terms these cases were either malarial or typhoid, the probability being that the majority resulted from malarial influences, for the annual admission rates of these undetermined cases were highest in Cuba and the Pacific islands where the prevailing fevers were malarial, and the curve of their seasonal prevalence in 1899 coincided with that of malarial fevers. In Cuba they prevailed chiefly during the four months August to November, inclusive, the highest rate occurring in October, the month of maximum prevalence of malarial diseases and of minimum prevalence of typhoid. The maximum rates of typhoid fever occurred in April and May, when the rates of the undetermined fevers were considerably below the mean of the year. Again, in the Philippines, the rate of admission of these fevers was above the mean of the year when the typhoid rate was low, and considerably below the mean of the year, from February to August, when the typhoid rate was high; but the maximum rate of the malarial and of the undetermined fevers occurred in November, and the minimum rate of both in February.

DIARRHEAL DISEASES.

The following tabulation presents the prevalence and results of diarrheal diseases in the Army, regulars and volunteers, as a whole, and of those parts of it stationed in Cuba, Porto Rico, the Pacific islands, and the United States:

[Ratios are per thousand of the strength.]

Commands.	1898.						1899.					
	Cases.	Ratio.	Discharges.	Ratio.	Deaths.	Ratio.	Cases.	Ratio.	Discharges.	Ratio.	Deaths.	Ratio.
Army	57,436	388.62	65	0.44	214	1.45	40,180	380.69	95	0.90	226	2.14
Cuba	2,796	335.05	1	.12	77	9.23	8,709	434.35	10	.50	29	1.45
Porto Rico	4,370	767.61	2	.35	8	1.41	2,023	542.80	6	1.61	10	2.68
Pacific Islands	3,959	399.60	20	2.02	25	2.52	25,249	642.80	62	1.58	180	4.58
United States	46,120	371.19	42	.34	104	.84	4,027	95.45	17	.40	7	.17

In the Army of the United States, during the decade 1887–1896, the average annual admission rate for diarrheal diseases was only 107.09 per thousand of strength, with 0.17 per thousand men as the rate of discharge for disability and 0.10 as the death rate. In 1897 the admission rate was only 73.17 per thousand, with 0.11 as the discharge rate and no death. In 1898, however, the admission rate rose to 388.62 with 0.44 as the rate of discharge and 1.45 as the death rate; and in 1899 it continued high, 380.69, with rates of discharge and of death about double those of the preceding year.

This large increase in the prevalence of diarrheal diseases in 1898 was consequent on the great aggregation of untrained volunteers in our camps in the United States, and the exposures of our troops, regulars and volunteers, on active service in Cuba, Porto Rico, and the Philippine Islands. Among the large number of troops in the camps in the United States the admission rate was over three times and the death rate over six times greater than the annual averages of the decade mentioned. This was due to dietetic errors and unnecessary exposures on the part of raw troops. Although the admission rate of the commands in Cuba was somewhat lower than that of the troops in the United States, the high death rate of 9.23 per thousand of strength among the former indicates a wholly different type of diarrheal trouble. Among the regular troops in Cuba at this time, 1 case in every 9.8 was reported as dysenteric. In the Philippines the death and discharge rates were relatively high, 2.52 and 2.02, respectively, per thousand of strength; but in Porto Rico, although the prevalence was great, there was fortunately no corresponding increase in the gravity of the cases. In Porto Rico there was only 1 death in 546 cases; in the United States, 1 in 443 cases; in the Pacific islands, 1 in 158 cases, and in Cuba, 1 in 36.4 cases.

In 1899, under the better sanitary conditions which resulted from the experience of the preceding year, the admission rate for diarrheal diseases in the United States fell to 95.45 per thousand of strength, and the death rate to 0.17, satisfactory approaches to the normal rates of times of peace; but the rates of the Army as a whole were kept high by high rates in the Islands. In the Philippines the admission rate became increased to 642.80 and the death rate to 4.58 per thousand of strength. In Porto Rico, also, the dysenteric character became more developed, but in the garrisons of Cuba the dangerous type of the disease was markedly diminished. In the United States there was 1 death in 575 cases; in Cuba, 1 in 300 cases; in Porto Rico, 1 in 202 cases, and in the Philippines 1 in 140 cases.

The absolute number of cases of dysentery in the Philippine Islands, as distinguished from acute or chronic diarrhea, can not be gathered from the reports, as in many instances the same case is recorded on one report as diarrhea and on another as dysentery.

Dysentery.—Lieut. Richard P. Strong, assistant surgeon, United States Army, a member of the board on the study of tropical diseases, see page 21, made a careful study of dysenteric cases in the laboratory of the First Reserve hospital, Manila, P. I., in which work he was assisted by Hospital Steward W. E. Musgrave, M. D., pathologist of the hospital. They reported the results of their investigations June 17, 1900. During a period of ten months prior to this date, 9,063 cases were treated in the hospital, and 1,328 of these, or 14.64 per cent of the total cases, were cases of dysentery. Of these dysenteric

cases, 581 were returned to duty from the First Reserve hospital; 125 ended fatally in the hospital; 283 were transferred to other hospitals in the Philippines, and 339 were sent to the United States for possible benefit from the sea voyage and change of climate. Their studies included 111 necropsies on dysenteric cases, 21 of which, on anatomical grounds, they classified as acute specific dysentery, 11 as subacute specific dysentery, and 79 as amœbic dysentery. A bacillus was isolated in 17 of the 21 cases classified as acute specific dysentery, and in 2 of the 11 subacute cases. In 1 of the former and 2 of the latter, this bacillus was not looked for. In 26 of the amœbic cases the bacillus was not found; in the remaining 53 it was not looked for. In 68 of the 79 amœbic cases motile amœbæ dysenteriæ were found. The bacillus isolated by Drs. Strong and Musgrave is similar to that discovered by Shiga in 34 of 36 cases studied in Kitasato's laboratory in Tokio, in 1898, in connection with the epidemic of dysentery then prevailing in Japan. They regard this bacillus dysenteriæ as the specific cause of what they have called acute and subacute specific dysentery. The blood serum of these cases usually exercised a marked agglutinative reaction on this bacillus. This reaction was observed as early as the third day and was generally distinctly manifest by the fifth or sixth day. In one grave case which proved fatal on the fourth day there was no reaction with the serum, either before or after death. The onset and progress of amœbic and specific dysentery are described as somewhat different. In the amœbic cases they found generally a gradual onset and an irregular course marked by periods of intermission and exacerbation of the diarrhea, with a tendency to chronicity and the frequent occurrence of abscess of the liver. In the specific cases, on the contrary, the onset is usually abrupt, the stools at first containing mucus which afterwards becomes streaked or colored with blood. The movements increase in frequency until finally the control over the sphincter appears to become lost. Straining and tenesmus are often excessive. There is great thirst and the tongue has generally a whitish coat. Extensive hemorrhages are unusual, but occasionally occur. Toward the end the movements become less frequent and may cease altogether shortly before death. With all this the accompanying pyrexia may not be high. The pulse is about 100, becoming very rapid as the patient dies from cardiac exhaustion. Nausea and vomiting are uncommon, but there is often tenderness on deep pressure over the colon. Recovery from these severe attacks is rare. Death or recovery takes place generally within two weeks. In the cases which recover, the urgency of the symptoms becomes gradually lessened. Recovery may then be early and convalescence be established by the fifteenth day. In other cases the disease may become subacute and last for months.

This subacute or chronic stage was carefully studied and reported upon March 23, 1900, by Dr. Chas. F. Craig, acting assistant surgeon and pathologist of the U. S. General Hospital, San Francisco, Cal. Dr. Strong has said that 339 of the dysenteric cases of the First Reserve hospital were sent to the United States. Here they were studied by Dr. Craig as cases of chronic dysentery from Manila. He investigated the stools from 205 cases and the morbid anatomy of 25 necropsies. In his report he divides the cases into three classes, (1) the follicular, (2) the pseudo-diphtheritic, and (3) the gangrenous, which he considers

rather as stages in the same pathological process, the second and the third as acute forms engrafted on the first.

The follicular cases were at least of two months' duration. There was but little tenesmus. The character of the stools is very fully described in Dr. Craig's report. Little blood was visible to the naked eye, but it was found pretty constantly on microscopic examination; mucus and pus rather abundant; pus cells often containing bacteria; intestinal epithelium abundant, sometimes in sheets with protoplasm granules and the cells sometimes vacuolated; bacteria in immense numbers, staphylococci, streptococci, and bacilli, the last of which preponderated. There was one long, slender bacterial form present in nearly all the cases, and in immense numbers; yeast cells frequent; cercomonas in 6 cases; anguillula in 1.

The morbid anatomy of the follicular cases may be briefly stated as follows: In all cases the stomach was congested in patches and showed areas of atrophy. The small intestine varied in color from nearly white to bright pink; coats very thin. Large intestine dull gray or slate colored, sometimes with very dark patches believed to be due to extravasated blood undergoing pigmentary change; coats thickened, in one case cartilaginous; calibre diminished; mucous membrane usually of a gray slate color, often with brownish pigmentation and acute congestion, and thickened; the follicles enlarged or ulcerated, or both; irregular punched-out ulcers of mucosa, or both it and the submucosa; cæcum and ascending colon oftenest affected, and next to them the rectum. In one case there was a follicular ulcer of the ileum near the valve.

The cellular elements of adenoid tissue were increased in number; tubular glands compressed and in places filled with a dense mass of leucocytes. Submucosa thickened, infiltrated with leucocytes collected in irregular masses which often obscured the muscularis; blood vessels but little engorged. Muscular coat, some leucocytes, more especially in the circular coat. No change in the serous coat. Solitary follicles enlarged, cells notably increased and surrounded by leucocytes. Much brownish and blackish pigment in adenoid tissue. Ulcers of solitary follicles varied in degree; in some the cellular structure broke down near the mucosa, involving the apex of the follicle. In a later stage the ulcer had undermined; the mucosa and submucosa were infiltrated with leucocytes; the ulcer never penetrated beyond the circular muscle; tubular glands sometimes fused with the follicles, forming cysts. Leucocytes and fixed tissue cells found in margins of ulcers and around blood vessels; fatty degeneration at junction of mucosa and submucosa. Number of leucocytes proportioned to depth of ulcer. If the circular coat was involved, the floor of the ulcer was irregular and composed of broken-down muscle fibers and leucocytes; the serous coat then was thickened. Besides the follicular ulcers there were also ulcers of the mucosa which destroyed the tubular glands more or less, and sometimes penetrated to the muscular coat; the edges of the ulcers and the submucosa were infiltrated with dense masses of leucocytes.

In three cases the pseudo-diphtheritic process had begun and the colon and rectum were a dirty greenish gray color with red patches; many areas covered with pseudo-membrane under which were small follicular ulcers; the exudate was very thin and very tenacious.

The pseudo-diphtheritic form was more common among the patients; an acute process on a chronic one. Prognosis grave. Essentially a

coagulation necrosis; the necrosed tissue sloughing off and leaving superficial ulcers which did not penetrate to the circular coat. The necrosis was caused by pressure of the mass of leucocytes and of the pseudo-membrane assisted by the bactericidal poisons. Stools usually dirty brown, sometimes dark brown and almost black from the pressure of blood; sometimes watery and exceedingly offensive; numerous red blood cells and pus cells, many of the latter having amœboid movements; but little mucous and that not glairy but more like pus; bacteria in immense numbers, cocci, spirilli, and bacilli, the latter preponderating; the same slender bacillus as was found in the follicular form; in three cases the cercomonas; shreds, strings, and pieces of pseudo-membrane of a dirty gray yellow or greenish color; also portions of mucosa, dirty gray yellow or greenish, in which glandular tissue could be microscopically made out; leucocytes were usually numerous; and clumps of granular material (detritus).

The morbid anatomy in the pseudo-diphtheritic form: The small intestine was leaden gray or very pale; its coats thin, though less so than in the follicular form. Large intestine grayish or greenish blue, with red or dusky brown spots; coats thickened, caliber narrowed; in two cases almost cartilaginous. The mucosa was a dirty greenish gray or dirty white, sometimes areas of bright red of acute inflammation; and was thickened, with dusky reddish folds. The ulcers did not penetrate beyond its submucosa; edges sloping; color between ulcers pale flesh color with patches of dirty gray or greenish exudate; shape generally round or oval, the latter the more common; sometimes communicated with each other by passages under the mucosa; there were often small ulcer cavities in the mucosa; sometimes the mucosa was elevated in places by accumulations of thin, glairy, nearly colorless fluid in the mucosa. Pseudo-membrane sometimes bright yellow, usually in irregular patches; sloughing in places in the form of patches, strings or shreds, the shreds giving the membrane a shaggy appearance; exudate usually tough and tenacious and most common in rectum and just below ileocolic valve. The small intestine showed patches of acute inflammation with areas of atrophy; hyperæmia of summits of folds; no ulcers. Stomach chronically inflamed, with atrophy and areas of congestion and pigmentation.

Microscopic appearances in pseudo-diphtheritic form: Columnar epithelium absent; adenoid tissue between tubular glands infiltrated with dense masses of leucocytes, and the glands invaded and pushed apart, the leucocytes extended in severer cases into submucosa; small ulcers beneath mucosa often not involving the submucosa; small cavities in mucosa surrounded by leucocytes; tubular glands inclosed by leucocytes; necrosis of the covering layer of the adenoid tissue and the leucocytes combined caused the ulcer, which had sloping or rounded edges and a smooth floor, densely infiltrated with leucocytes. Submucosa in neighborhood of ulcer had a vast swarm of leucocytes and connective tissue cells; blood vessels dilated and engorged. The slough was composed of degenerated leucocytes and granular detritus. The pseudo-membrane was a fibrillated, granular material, inclosing numerous leucocytes, blood cells, and immense numbers of bacteria; there was an increase of interglandular tissue and infiltration with leucocytes; in more advanced cases leucocytes were found in the submucosa; capillaries engorged, and there were many capillary hemorrhages in

mucosa and submucosa; most noticeable before ulceration occurred. Leucocytes very numerous around solitary glands, which finally disappeared, replaced by dense masses of leucocytes; muscularis mucosæ also disappeared; increase of fibrous material in submucosa; circular muscle usually infiltrated with leucocytes and connective tissue cells. Pseudomembrane often thick and nearly homogeneous, without distinct fibrillation or cell structures, sometimes as thick as the mucosa and submucosa combined.

Dr. Craig considers the gangrenous form as an intense degree of the pseudo-diphtheritic. The mucosa and submucosa were gangrenous with streaks of greenish pus and had a horrible odor. The process supervened on the other forms. Death occurred from pyæmia, with metastatic abscesses. The stools were thin and slimy; color slate, brown, and black; odor very offensive; contained blood cells, greenish pus cells, and bacteria in immense numbers; large pieces of mucous membrane with glandular structure and dense infiltration of leucocytes; sometimes only granular detritus.

The intestines were matted together and easily torn. Large intestine greenish black with irregular areas of deep black corresponding to the gangrenous areas; coats generally thin and fragile. Small intestine reddish brown with areas of bile-stained tissue and many areas of pigmentation; coats very thin, easily ruptured; in two cases partly gangrenous, covered with necrosed tissue and pus, and with regular ulcers penetrating to muscular coat. Stomach grayish blue, with many areas of pigmentation in wall and acute inflammation. Internally the mucous membrane of the large intestine was reddish brown or greenish yellow or bluish; in rectum and sigmoid flexure greenish black streaked with yellowish green pus; near ileocolic valve dusky red with greenish and brownish areas, where gangrene had advanced more rapidly; surface of rectum and sigmoid covered with thick yellow-green pus and showed deep irregular ulcers with undermining edges, covered with shreds of tissue stained with blood and pus. Mucosa, submucosa, and muscular coat destroyed in large areas; in places, especially in rectum and around ileocolic valve, the mucosa and submucosa were greenish black, pultaceous, blood-stained, with an exudate of yellowish green pus and swollen areas from which on section there exuded pus and semitransparent glairy gelatinous fluid. Where the gangrene was most intense there were no distinct ulcers; in transverse colon were many ulcers varying in size and shape, some oval, transversely directed, edges undermined, penetrating to circular coat. There were also large irregular ulcers, with swollen, undermined, or sloping edges, covered with large sloughs; very few follicular ulcers. Where the gangrene had not involved there were many superficial ulcers of the mucosa; coats thickened.

Microscopic examination of rectum showed a mass of leucocytes, red blood cells, granular detritus, and broken-down muscular tissue; mucosa, submucosa, and circular muscle destroyed; small portions of mucosa and submucosa preserved in places and infiltrated with leucocytes, red cells, and fatty detritus. The mucosa in the situation of the ulcers was covered with pseudomembrane, consisting of leucocytes, fibrillated material, tubular glands, and adenoid tissue, infiltrated with leucocytes, red cells, and granular detritus. The ulcers were irregular in shape, undermined, and penetrated to muscular coat;

floor irregularly elevated, the elevations composed of fibrillated material in which were many leucocytes and blood cells. Submucosa showed leucocytes and many hemorrhages; muscularis mucosæ destroyed; muscular coats much thinned, with areas of leucocytes; infiltration especially numerous near ulcers; cyst-like cavities full of leucocytes between muscle fibres.

The complications found post-mortem were similar in the three forms, except that metastatic abscesses were found only in the gangrenous form.

Under the head of bacteriology, he reports that since October 4, 1899 (five and one-half months), he had made over 200 microscopical examinations of fæces in cases of dysentery, and had found the amœba coli in but 3 cases; he had not found amœbic abscesses of liver at all, and had failed to find the amœba in the intestinal mucosa, in scrapings from intestinal ulcerations or in sections of the intestine itself, stained with thionin or methylene blue. He, however, isolated a bacillus identical with that found by Dr. Flexner, in Manila, previously described by Shiga, and which was pathogenic to small animals. Isolated by plate method from scrapings of the floor and edges of intestinal ulcers in 2 cases of pseudo-diphtheritic dysentery. The bacillus was practically identical with the bacillus typhosus. He had not succeeded in staining any flagella. It agglutinated with the blood of the cases from which it was isolated, and also with the blood of a few other cases of dysentery, but not of all, suggesting the possibility of the agglutinating power being lost or that there were different varieties of dysentery in the hospital. He experimented on 4 guinea pigs, in one of which a diarrhea developed; the pig died two weeks afterwards. Acute inflammation, but no ulceration, of the entire intestinal tract was found. The organism was recovered from the spleen and intestinal contents.

Bacteria were always found in the intestinal coats. The number was less in the follicular form and seldom present at all in the muscular coat. They entered apparently by way of the lymphatics; were found in and between the tubular glands, no one species preponderating. They were numerous around the ulcers, mainly the micrococci. In the pseudo-diptheritic form, immense numbers of bacteria were found in the false membrane and in the mucosa, the micrococci preponderating; the same was also true for the walls of the ulcers and in the submucosa. In the gangrenous form bacteria were in immense numbers in its sloughs and diseased mucosa, submucosa, and muscular coat beneath the ulcers. In places, in all the forms, they were so numerous that they stained en masse, the separate organisms being indistinguishable. They were also abundant around hemorrhagic areas. Generally speaking, bacilli and micrococci were found in nearly equal proportion in all forms of dysentery, in the superficial part of the mucosa; but in the deeper layers the micrococci were more numerous than the bacilli.

Maj. A. C. Girard, surgeon, United States Army, commanding the General Hospital, Presidio of San Francisco, Cal., submitted the following tabulation showing the dispositions recorded in 484 admissions, January 1 to June 30, 1900, from the Philippines, with diagnoses of tropical bowel affections:

	Number.	Per cent.
Duty within 15 days from date of arrival	78	16.12
Duty within 30 days from date of arrival	97	20.04
Duty within 60 days from date of arrival	102	20.21
Duty after 60 days from date of arrival	68	14.05
Discharged within 30 days after arrival	5	1.03
Discharged within 60 days after arrival	22	4.55
Discharged after 60 days after arrival	15	3.10
Died within 30 days after arrival	9	1.86
Died within 60 days after arrival	2	.41
Transferred	5	1.03
Remaining	61	12.60
Total	484	100.00

The medical officers who had the care of these cases are generally of the opinion that the earlier a patient affected with tropical dysentery is transferred to the United States for treatment the greater is the likelihood of a speedy and lasting recovery. When a case becomes subacute or chronic instead of resulting in perfect recovery at the end of two or three weeks, it is believed that the chance of eventual recovery will be greatly improved by an early transfer to the United States. Besides this, it seems advisable to retain in service in this country men who have recovered from an attack of tropical dysentery, for reports from medical officers serving in the Islands show that a return to duty in the Tropics frequently means a recurrence of the disease.

The following is the report made by Drs. Strong and Musgrave on the etiology of dysentery:

PRELIMINARY NOTE REGARDING THE ETIOLOGY OF THE DYSENTERIES OF MANILA, BY LIEUT. RICHARD P. STRONG, ASSISTANT SURGEON, UNITED STATES ARMY, DIRECTOR OF THE ARMY MEDICAL LABORATORY, AND W. E. MUSGRAVE, M. D., HOSPITAL STEWARD, UNITED STATES ARMY, RESIDENT PATHOLOGIST TO THE FIRST RESERVE HOSPITAL, MANILA, P. I.

During the past ten months there have been 9,063 cases admitted to this hospital (First Reserve military hospital) for treatment. Among this number the hospital clinical records show 1,328 cases with a diagnosis of dysentery. Of these dysenteric cases 125 died, a mortality of 9.4 per cent. These figures, however, do not represent the actual mortality among them, for 339 cases of dysentery were transferred to the United States and 283 were sent to other hospitals. Only 581 were returned from here to military duty. Of those that were invalided to America a number died (for most of these cases were sent home because there was little hope of their recovery in this country), and of the number sent to other hospitals, as we know, also a proportion died, but we have no record of the death rate among these cases in either instance cited.

All these figures show, then, is that the number of dysenteric cases that have died here is not below 94 per 1,000 dysenteric cases.

The following table shows the statistics compiled from the hospital clinical records:

[Cases treated in hospital, 9,063; percentage of dysenteric cases to admissions, 14.64.]

Treated in hospital.	Total number.	Transferred to the United States.	Transferred to other hospitals.	Returned to duty.	Died.	Mortality.	Average number of days sick.	Per centage of admissions returned to duty.
Dysentery cases	1,328	339	283	581	125	9.4	24	43.7
Acute specific dysentery cases	712	144	116	398	54	7.58	18	55.8
Subacute specific dysentery cases	55	1	1	45	2	3.6	19	81.8
Amœbic dysentery cases	561	191	163	138	69	12.3	35	24.6

In a hospital of this size, often crowded to 1,300 beds, when the staff was necessarily much overworked at times, perhaps in many cases where hasty or insufficient examinations (both clinical and of the stools) were made, the type of the disease was not accurately diagnosed or recognized. At any rate, when we turn to our necropsy records we find, at least among the fatal cases, our statistics in regard to the variety of the disease somewhat different. The cases from the hospital clinical records, therefore, are not made the subject of our report, but are omitted. Only those cases are included which the writers have either studied clinically or at necropsy also, when the opportunity presented itself.

Our records show, of 271 necropsies, 111 cases of dysentery. Of these 111 cases, classified primarily entirely upon anatomical changes found at necropsy, and not from clinical symptons, there have been 21 cases of acute specific dysentery, 11 cases of subacute dysentery, and 79 cases of amœbic dysentery.

The following table gives a summary of our necropsies:

[Necropsies, 271.]

	Total number.	Average number of days sick.	Bacillus dysenteriæ obtained at necropsy.	Bacillus dysenteriæ not tried for.	Motile amœbæ dysenteriæ found at necropsy.
Dysentery, all cases	111	.....	19	56	68
Acute specific dysentery	21	8	18	1	.....
Subacute specific dysentery	11	20	2	2	.....
Chronic dysentery	79	.....	.....	53	68

It is not our purpose to define here just what we mean by these three anatomical types of dysentery. They will be referred to later. As a result of our investigations we believe that we have been able to recognize in the cases of dysentery from in and about Manila and in those from several more remote towns at least two distinct types of dysentery (viz, an acute specific dysentery and an amœbic dysentery), with two distinct etiological factors. The subacute type we regard only as a later picture of the acute stage of the specific dysentery and as having the same etiological factor. These two types, as stated, were classified primarily entirely according to the anatomical changes found at necropsy; yet when the type of each case, determined at necropsy, is compared with its corresponding clinical history—although from the symptoms alone these cases may often be (as we shall see) at first difficult to differentiate and classify—they may still be easily separated from one another during life, the one being recognized by its specific blood serum reaction and the other by the presence of amœbæ dysenteriæ in the stools; and, moreover, when we study more carefully their courses we may see that the clinical cycle of the disease, as well as the onset, is generally somewhat different in each type.

It is the principal object of this paper to determine by an analysis of our cases in how far our impressions may be justified and to compare our results with those of the numerous observers in other countries.

Let us first turn our attention to a summary of the different micro-organisms described in dysentery before considering further these two types of dysentery.[1]

HISTORY OF THE MICRO-ORGANISMS DESCRIBED IN DYSENTERY.

As early as 1883 Prior (Centralblat f. klinsche Medecin. 1883, p. 273) described micrococci singly and in clumps in the stools, in the mucous secretion of the intestine, and in the mucous tissues themselves in dysentery. The bacillus subtilis he also found, but in small numbers, in the stools, and not in the mucous secretion of the intestine or lying in the tissues.

In 1886 Hlava (Casop. lék cesk *v.* Praze, 1887, p. 70) believed dysentery to be a disease caused by micro-organisms. He studied dysentery bacteriologically and succeeded in isolating 19 different organisms from the intestinal canal of patients suffering from this disease. He finally became convinced that no specific organism was to be regarded as the cause of dysentery, and he was unable to produce dysentery or anything resembling it in animals with the organisms he found. Therefore he concluded that bacteria are not the cause of dysentery.

[1] We fear that our literature is far from complete; we have as yet no large medical library in Manila for reference.

Klebs in his book (Die allg. Path. v. 1, Jena, 1887, p. 206) describes an organism which he states he believes to be the cause of dysentery. This organism is a small bacillus which forms small whitish dot-shaped colonies on gelatin. No spore formation could be observed. In stab cultures in gelatin they neither liquefy nor grow into the depth of the media. This organism was isolated from the intestinal glands of dysenteric cases, but was never found in the intestines of those suffering from other diseases. Inoculation experiments in dogs and rabbits gave no positive results.

Ziegler (Path. Anatomie, Jena, 1892) considers at least some of the epidemic forms of dysentery due to bacterial infection, and he thinks that certain epidemics have been so intimately associated with bacterial invasion of the intestine that the causal connection of the micro-organisms with the disease can hardly be doubted. In a local outbreak occuring in Germany he observed a small bacillus partly scattered, partly occurring in masses within the glands, glandular epithelium and connective tissue of the large intestine. Their multiplication in the tissue was followed by inflammation, tissue necrosis, and degeneration.

Chantemesse and Widal (Acad. de Med., 1888) found in the walls of the large intestine and in the mesenteric glands and spleen of a man who died of dysentery, and in the stools of five persons suffering from tropical dysentery, a bacillus which they consider specific and probably the cause of dysentery. This organism they described as a short rod with rounded ends, which does not stain well, and has but slight motility. On agar plate cultures the colonies appear first as small white specks, which often assume a yellow color, but in a few days the yellow color vanishes, causing the colonies to become white and granular. Under a low power of the microscope these colonies have often a darker center and a lighter, sharply circumscribed, periphery. Gelatin cultures show no liquefaction of the media. This bacillus was found when injected in pure cultures into guinea pigs, either by the mouth or directly into the large intestine, to give rise to a diphtheritic-like inflammation of the mucous membrane of the large intestine. It is supposed by some observers, however (Baumgarten, Kartulis, and others), that this organism was only a variety of the bacillus coli communis which had acquired special virulence.

Veillon and Jayle (Semaine méd., Par., 1891, p. 13) found in liver abscesses and in the intestines of those sick with dysentery the bacillus coli communis.

Maggiora (Archiv. Ital. de Biologie t. xvi, 1891) studied an epidemic of dysentery in which only three deaths occurred out of 2,001 cases. The duration of the disease was from six to twelve days. He examined the feces microscopically in 20 cases and only found the amœba in 1. In 11 cases he examined the stools bacteriologically. The bacteriological examinations showed the bacillus coli communis always present in great numbers, and in most of the cases the proteus vulgaris was also present, but not in great numbers; in 6 cases the bacillus fluorescens liquefaciens was found; in 2 staphylococcus pyogenes aureus was found; in 1 staphylococcus pyogenes albus; in 5, bacillus pyocyaneus in small numbers. The colon bacillus and bacillus pyocyaneus were found to be very virulent. Maggiora inclines to the belief that perhaps bacillus coli communis developed an abnormal virulence and caused the above epidemic.

Grigorieff (Mikro-organismen in dysenterie centralblat. f. Bakteriologie xii, 1892) found in the feces of 10 dysenteric cases, as well as in the organs of those who had died from dysentery, a particular bacillus in every case examined, and he believes this bacillus to be identical with the one described by Chantemesse and Widal. On gelatin plate cultures the colonies magnified under a low power appear as bright, somewhat seed-like, pale yellow disks. The superficial colonies are larger than those at a lower level. These disks gradually expand, and after five days concentrated rings are formed. Stab cultures in gelatin show after twenty-four hours a somewhat broad, furrowed, gray band, somewhat resembling a goose feather (Gansefederfahne), with no liquefaction of the media. Upon agar slants there appears after twenty-four hours a light grayish-white layer, externally thinner than internally. Upon potato there appears after forty-eight hours a thick, grayish-yellow growth, with a glistening surface. The bacilli decolorize by Gram's method. Various experiments with animals were always unsuccessful.

Ogata (Centralblat. f. Baktr., 1892) studied an epidemic of dysentery occurring in the province of Oita, in Japan, and found no amœbæ in the stools of the cases examined. In the fresh discharges of 15 cases he succeeded in isolating from 11 of the 15, as well as from the ulcers of a case which had died of dysentery, short, fine bacilli, measuring about 1 μ in length, with rounded ends and active movement. This organism did not decolorize by Gram's method. In agar cultures greenish-yellow colonies were formed. In gelatin cultures the media was liquefied. When introduced into guinea pigs by os or rectum they caused ulcerative processes in the large intestine. Ogata thinks that this organism, discovered by him, is probably the

cause of the dysentery in Japan. He also found, according to his report, in the discharges from the large intestine of all of the 15 cases examined, as well as from the ulcers in the large intestine, short bacilli, which do not liquefy gelatin, decolorize by Gram's method, and which were not pathogenic for the animals experimented upon.

Zancarol (Dysentérie et abces du foie, Progrès médical, Alexandrie, 1893) believed that both dysentery and liver abscess have the same etiological factor, both being produced by a streptococcus. In the blood of 8 persons suffering from liver abscess he found streptococci, and in 6 liver abscess cases out of 9 he found streptococci either microscopically or in cultures. In one case staphylococci were isolated, and on another occasion he could not determine whether staphylococci or streptococci were present. He concluded, therefore, that both dysentery and liver abscesses are due to streptococci.

Laveran (Compt.-rend. Soc. de biol., Par., 1893, p. 875), in a study of a limited dysenteric epidemic in Paris, examined 10 cases and only found the amœba in one. In all of the 10 cases examined he found a bacillus in great numbers which could not be regarded as entirely distinct from bacillus coli communis. He believes that at this stage of our knowledge it is impossible to form a definite judgment of the etiology of dysentery in Europe.

Calmette (Archives de méd. nav., Sept., 1893), who studied the epidemic disease at Saigon, came to the conclusion that of all the bacteria present in the stools the bacillus pyocyaneus was the one of greatest pathogenetic importance, and the only one in his opinion capable of reproducing in animals the lesions of dysentery. The pathogenic effects of this organism are, however, he states, increased by the presence of streptococci. He attaches little importance to the amœba as the cause of the disease.

Vivaldo (Riforma med., 1894, No. 138), during the epidemic in Padua, examined the stools in 20 cases of dysentery, but never found the bacillus described by Ogata as the cause of dysentery. He believes that the amœbæ have a specific action in preparing the ground for the action of the micro-organisms.

Arnaud (Compt.-rend. Soc. de biol., Par., 1894, p. 239) examined 60 cases of dysentery in tropical climates and concluded that bacillus coli communis, or a pathogenic variety resembling it biologically very much, was to be regarded as the cause of dysentery. The more severe the termination of the disease the more frequently was this bacillus found in pure cultures and the greater was its virulence. Five dogs inoculated by way of the rectum showed characteristic ulceration of the large intestine.

Bertrand and Bancher (Gaz. hebd., Oct. 6, 1893, and Apr. 4, 1894) studied an epidemic of dysentery among the troops stationed at Cherbourg. They found a number of bacteria present in the dysenteric discharges examined, viz, a septic anaërobic vibrio, bacillus coli communis and another organism which seemed to be a variety of it, bacillus pyocyaneus, bacillus fluorescens, staphylococcus pyogenes aureus, albus and citreus, two varieties of streptococci and bacillus œdematis maligni. They concluded that no one of the micro-organisms found by them can be considered as the specific agent of the disease, but they ascribe to the bacillus pyocyaneus the most important part in the causation of the dysentery. Their observations lose considerable in value from the want of evidence as to the presence and deposition of the organism in the tissues. In the fæces from patients with the chronic dysentery of tropical climates they further found practically the same organisms as they met with in the acute disease in France, but they conclude that in the tropical form the bacillus coli communis, more or less modified, predominated.

Silvestri (Gior. d. r. Accad. di med. di Torino, 3. xlvii, 1894), in studying an epidemic of dysentery in Turin, found in the bacteriological examinations he made of a number of the stools a large diplococcus. This organism when injected in pure cultures into the rectum of dogs and cats caused severe catarrh of the intestine. The process was more marked in the cats.

Kruse and Pasquale (Untersuchungen über Dysenterie und Leberabscess, Zeitschr. f. Hygiene Bd. 16, Heft 1, 1894), in discussing the bacteria found in association with amœbæ in dysentery, state that in 100 cultures from fresh dysenteric stools and the contents of liver abscesses and (post-mortem) from several organs, there were found streptococci of various species in 50 per cent, typhoid-like bacilli in 25 per cent, the bacillus pyocyaneus, a bacillus resembling the pseudo-diphtheritic bacillus, and the staphylococcus pyogenes. None of these organisms were present so constantly or in such numbers as to suggest a specific relation to the dysenteric lesions. Post-mortem the bacteria were always most numerous in the blood from the portal vein. Inoculation experiments into the rectum of cats with these organisms gave a negative result. The authors do not conclude that the organisms found in association with the amœba possess no pathogenic properties whatever, but rather that they can not be regarded as the primary agents in this form of dysentery.

Chaltin (Centralbl. f. innere Med. Aug., 11, 1894), in an investigation of dysentery, found that as a rule the dejections from these cases contained the bacterium coli commune and proteus vulgaris. He failed to find the amœba in all of 325 cases examined by him, and concluded that these organisms are of no particular significance in temperate climates.

Celli and Fiocca (Annali dell' Istituto d' igiene sperimentale di Roma, 1895) made some preliminary communications about their study of dysentery. They obtained their material from sporadic cases observed in Rome, Tivoli, and Siena, and from epidemics that occurred in Bellino and Forli. They also studied cases of dysentery from Alexandria, Egypt. In all, they studied 62 cases. They concluded that amœbæ, especially the amœba coli, are not to be regarded as a direct cause of this disease. They injected dysenteric stools free from amœbæ into cats by the rectum and produced dysentery. They conclude that dysentery is caused by a specific variety of the bacillus coli communis, which they state is always present in the stools of dysenteric patients. The organism bacillus coli communis, which is generally nonpathogenic, they state, can acquire, under certain circumstances, very virulent properties; that in the bowels it is often associated with a bacillus like that of typhoid, as well as with a streptococcus, and they assert that, introduced into animals by the mouth or injected into the rectum, either singly or all of these organisms, but particularly, however, when in combination, excite dysentery. They consider bacterium coli dysenteriæ to be but a variety of bacterium coli commune, a variety that, being acted upon by other bacteria, assumes a most virulent character. During this process the almost harmless bacillus is converted into the most virulent bacterium of dysentery. The latter organism then secretes a powerful toxin that is capable of producing typical dysentery when given through mouth or rectum or injected subcutaneously into the connective tissue of animals. This dysenteric toxin may be precipitated by alcohol from bouillon cultures, and is soluble in water.

The next year Celli (Ann. d' ig. sper., Roma, 1896, p. 203) published more extensive communications. He invariably succeeded in isolating B. coli dysenteriæ from dysenteric cases. He considers that dysenteric infection is primarily caused by a toxin produced by this organism. This toxin, he states, may have a pyogenic, dysenteric, or marantic effect, and is to be found in the blood of marantic, dysenteric men and animals. With gradually increasing doses of this toxin animals may be given a high degree of resistance against the marantic or dysenteric, but not against the pyogenic action. This immunity is of short duration, however. The intestinal ulcers he states to be due to the pyogenic bacteria of the intestinal canal.

Bruno Galli Valiero (Centralbl. f. Bact., Jena, 1896, v. 20, p. 901) in the same year reported upon the etiology and serum therapy of dysentery. In one case of dysentery in Valterina he isolated an organism which measures 1.75μ, 2.6μ, or so short (0.87μ) that they resembled cocci. Plate cultures showed colonies which in a few days became of a greenish tinge. Gelatin cultures were slowly liquefied and milk in forty-eight hours was peptonized. Milk sugar was fermented, but the indol reaction could never be obtained in cultures of bouillon. The organism was not decolorized by Gram. Experimental dysentery was produced in chickens and dogs by inoculation. The serum of a dog immunized with this bacillus can protect guinea pigs and chickens against infection from it. Valiero believes that this bacillus, which he isolated, is identical with bacillus coli dysenteriæ of Celli, and is nothing more than a variety of bacillus coli.

Pottein, in 1897, isolated from the stools of a severe case of dysentery, in addition to the bacillus coli communis, a micro-organism which he calls the streptothrix dysenterica. The bacillus coli communis isolated possessed only moderate virulence. He concludes that in all probability the streptothrix dysenterica was the original irritating cause of the dysentery in at least this one case, and that he hopes it may be encountered again in other cases of dysentery.

In 1898 K. Shiga (Centralblatt f. Bakt., Parasitenkunde und Infektionskrankheiten, xxiv. Band, 1898), working in Kitasato's laboratory in Tokyo, described a bacillus in connection with the epidemic form of dysentery occurring in Japan. He studied 36 cases and obtained a specific organism in 34. He reasoned that when the serum of a person suffering or having suffered from a certain disease has an agglutinating action upon a certain form of bacteria this organism has probably an intimate connection with that disease. Using this argument as an aid in his work, he isolated a bacillus which he believes to be the only organism of dysentery, at least of the kind prevalent in Japan. This organism he names the bacillus dysenteriæ. The blood serum in all of the 34 cases of dysentery examined showed a positive agglutination for this organism. He describes the bacillus as a short rod with rounded ends, much resembling bacillus typhosus or the greater portion of the coli group. It is possessed with moderate motility, but flagella have not yet been dem-

onstrated; neither has spore formation been observed. The organism decolorizes by Gram's stain.

Upon gelatin plates at room temperature there appear, after a few days, small round dots, which magnified under low power are slightly yellow and finely granular. After a few days they increase in size; the middle portion of the colonies then appears, under a low power, darker, while the outer zone appears brighter and more seed-like. The superficial and deeper colonies show no marked variation. In stab cultures of gelatin a whitish strand forms the whole length of the stab. The gelatin is not liquefied.

Single colonies upon slanted agar appear, after twenty-four hours in the incubator, moist, bluish, and partially translucent. After two days they present a combination of a middle dark and a peripheral bright, sharply defined zone.

The growth on glycerin agar is slightly more abundant than on ordinary agar. The organism grows on blood serum without liquefying it.

In the stab cultures of glucose agar there is formed along the whole line of the puncture a thick gray-white strand without the development of gas. Upon potatoes, after twenty-four hours in the incubator, there is hardly any perceptible growth, only the surface appears slightly shiny. After two days this changes to a yellow-brown. In the course of a week the growth is heavier and of a deeper brown color. Bouillon cultures show, after a day in the incubator, a somewhat intense cloudiness, with a moderate precipitate. No pellicle is formed on the surface. No indol reaction is present.

Litmus milk, after twenty-four hours in the incubator, appears reddish; otherwise, however, it undergoes no change. The milk never coagulates.

This bacillus was pathogenic for mice, rabbits, and guinea pigs when injected subcutaneously. Pure cultures injected into the abdominal cavity of a guinea pig caused death from general peritonitis, with hemorrhages in the intestinal wall and bloody mucus in the intestinal contents. In rabbits whole agar cultures introduced by way of stomach or rectum produced only temporary loss of weight.

We quote in detail the following experiments on cats and dogs:

1. A young cat was injected subcutaneously with one-half of an agar culture. Result: Weakness, loss of appetite, death within four days. At necropsy plate cultures showed bacillus of dysentery from the point of inoculation, blood, spleen, and liver. Intestines normal.

2. A young cat was given an enema of weak ammonia water. Result, slimy stools. The following day the stools were examined and found free from bacillus of dysentery. A large quantity of dysenteric faeces was injected by way of the rectum. More slimy stools resulted, but bacillus of dysentery was not found. Death within three weeks. Intestines found normal.

3. Two cats (480 and 700 grams) were fed one-half a drop of croton oil in their food. Result, soft stools the next morning. No dysenteric bacilli found. The second cat was given a whole agar culture of bacillus of dysentery into the stomach. The first cat recovered from diarrhea the next day, while the second had slimy and gray stools. The diarrhea lasted a whole week; stools examined and bacillus dysenteriæ constantly obtained in culture. Death in four weeks. Loss of weight, 510 grams. Necropsy: Mucous membrane hyperæmically inflamed. From cæcum to rectum the whole bowel filled with mucus, or faeces covered with mucus. Bacillus dysenteriæ obtained from the cæcum and large intestine.

Cat fed with large quantity of bacillus dysenteriæ; no results.

It will be seen, then, that in only one cat which had been given croton oil previously was any pathological change in the intestine produced.

Shiga first satisfied himself that bacillus dysenteriæ did not exist in the stools of a small dog. He then introduced a whole agar culture of bacillus dysenteriæ into the stomach by means of a probe. Results: Next day the animal passed grey stools of soft consistency; bacillus dysenteriæ was present in abundance. On the third day the animal refused food; a yellowish watery diarrhea with vomiting occurred. On the morning of the fifth day, death. Dissection: Upper part of small intestine 50 cm. long filled with mucus. Intestinal wall showed several circumscribed hemorrhages, the largest about 1 cm. in diameter. The large intestine mucous membrane was loosened up and covered with mucus. The rectum was relatively healthy and the other organs showed no change. From the mucus of the small intestine pure cultures of bacillus dysenteriæ were obtained. Cultures from the blood and other organs were sterile.

In conclusion of his experiments on animals Shiga states that whether he used dysenteric dejections or pure cultures of bacillus dysenteriæ he could not produce similar changes of the intestines as in human dysentery. The most favorable results were, he states, when he obtained hyperæmia and hemorrhages in the intestinal

mucous membrane in guinea pigs (through intraperitoneal injections of pure cultures) and in dogs and cats by the injection of pure cultures by way of the stomach.

A small portion of a bouillon culture in which the organisms had been killed when injected into Shiga's arm caused rather violent local and especially general reaction as in severe cases of dysentery. His own blood serum showed agglutination for this bacillus in dilutions of 1 to 10 ten days after the inoculation.

Shiga lays stress upon the stage of the disease in which the organism occurs in greatest numbers in the stools: this being at the most violent period, clinically, of the dysentery. He states that pure cultures of the organism may then be obtained direct from the bloody mucous stools, besides a few colonies of colon bacilli, streptococci, and diplococci. When the stools become pus-like and then of ordinary feculent consistency the other bacteria constantly increase in numbers while the dysentery bacilli gradually diminish. From the dysenteric stools he obtained pure cultures of over ten varieties of bacteria, but with the exception of the bacillus of dysentery, none appeared constantly and none of these other organisms showed any constant agglutination with the blood serum of dysenteric patients. He never found this organism in the stools of healthy patients or in those suffering from other diseases (typhoid fever, 4 cases; acute diarrhea, 2 cases, and chronic diarrhea, 3 cases). In a case of beri-beri also this bacillus was absent. He studied 3 cases of dysentery at necropsy, and obtained from 2 this same organism from the intestine and also from the retroperitoneal glands. In both cases the bacillus coli communis was also obtained from the glands, and bacillus coli and other bacteria from the intestine. It is unfortunate that there is no detailed description of the anatomical lesions found at the necropsies, that the lesions might be recognized.

In 11 cases this organism gave negative results for agglutination with the blood serum of healthy individuals. The serum of 3 cases of typhoid fever, of 1 case of acute and of 2 cases of chronic gastric catarrh, and also of a case of beri-beri, all failed to agglutinate this organism. The serum of the calf, goat, rabbit, mouse, cat, guinea pig, chicken, and pigeon also failed to agglutinate it.

Shiga also describes 2 varieties of colon bacilli that were occasionally found in dysenteric stools, which sometimes showed agglutination with dysenteric serum as well as with the serum from normal cases. He found amœbæ in 5 of the 34 cases he examined and he thinks it is very probable that the balance of the cases also contained amœbæ.

Thus, when we review this literature we see that in the more recent work on the bacteriology of dysentery, in addition to Shiga, Kruse and Pasquale and Celli all found typhoid-like bacilli in the stools of dysenteric patients; while Ogata found, in addition to the organisms which he supposed to be the cause of the dysentery studied, an organism which he describes as a short bacillus, which does not liquefy gelatin and decolorizes by Gram's solution. This organism was found in the discharges of every case studied. When injected into animals it did not produce dysenteric changes.

Celli stated that his typhoid-like bacillus, as well as his streptococcus and bacillus coli were all capable of producing dysentery either singly or in combination. Kruse and Pasquale found typhoid-like bacilli in 25 per cent—that is, in 25 out of 100 examinations—and the question immediately suggests itself to us, Were all of these 100 cases of the same type of dysentery? We know from Kruse and Pasquale's report that a number of these cases were amœbic cases; but were they all of this type, and whether in these 25 cases in which typhoid-like bacilli were obtained there was not a difference in the anatomical picture at necropsy and some difference in the clinical histories in these cases from those of the remaining 75? At any rate, when we turn to our own dysenteric cases we find that we have obtained typhoid-like bacilli from the large intestine or contents thereof in 28 cases. When we come, however, to study the cases in which we have found these typhoid-like bacilli at necropsy we see that in not one of them were amœbæ found, and that the anatomical picture at necropsy, and often the clinical histories, were quite different in these cases from 97 other cases in which amœbæ were found post-mortem.

Let us now describe in detail this typhoid-like bacillus which we have found and the cases in which we have encountered it.

Morphology.—Bacilli with rounded ends which differ in morphology in various culture media. On agar cultures they generally appear as short rods with rounded ends measuring 1 to 3 μ in length and about 0.4 to 0.5 μ broad, occurring not frequently in pairs. In twenty-four-hour bouillon cultures the rods are always longer, often measuring 3 or 3.5 μ in length, occurring frequently in pairs; occasionally (particularly in old bouillon cultures or in fresh bouillon cultures made after many generations on artificial media) the rods may be seen even longer, and it is not

infrequent then to observe filaments of several organisms. The organism possesses no capsule and does not form spores. No flagella have been demonstrated.

Staining properties.—They stain readily and evenly with ordinary aniline dyes and are easily decolorized by Gram's method, but not decolorized by alcohol except by prolonged treatment. Old bouillon cultures sometimes show slight irregularities in staining.

Cultural characters.—An ærobic and facultative anærobic very slightly motile bacillus. Spore formation has not been observed. It grows on the usual media both at room temperature and in the incubator.

On agar plate cultures, after twenty-four hours in the incubator, superficial and deep colonies develop. The surface colonies are round, of a distinctly bluish white tinge and delicate, measuring from about 0.5 to 1 mm. in diameter; under a low magnifying power these colonies are often nucleated, having a darker center with a gradually growing lighter periphery. They are granular with often a tendency toward central radiation of the granules. These colonies are generally round with even borders. The colonies in the depth are small, more yellowish in color, oval or round, and present nothing characteristic.

Often from the twenty-four-hour plate cultures made from the stools of acute dysenteric cases when the plates are held up to the light the colonies of dysenteric bacilli can be picked out from the colon colonies by their more delicate growth and by their bluish tinge. In older plate cultures the colon demonstrates that it is a heavier grower. From close observation of many plate cultures we have concluded that in twenty-four-hour plate cultures certain colonies of bacillus coli communis resemble the colonies of those of bacillus dysenteriæ so closely that they can not be told apart either by the naked eye or by a low magnifying power. On the other hand, colonies of the bacillus of dysentery never resemble certain common forms of colon colonies.

On agar slants with bacillus dysenteriæ a moderately heavy growth appears after twenty-four hours, bluish white by transmitted and whitish by reflected light. The growth is lighter than that of bacillus coli communis and sometimes even lighter than that of bacillus typhosis.

On glycerin agar the growth is about the same as on ordinary agar. In gelatin stick culture the organism grows along the track of the needle without liquefying the medium.

In glucose agar stick cultures there is never any production of gas. The growth occurs along the track of the needle and slightly on the surface about the point of inoculation of the medium.

Litmus milk is always slightly reddened after twenty-four hours. The red color does not change further and no other change occurs after one week.

Ordinary milk is neither coagulated nor peptonized, but appears unchanged, though the organism grows well in it.

Litmus lactose agar is apparently not changed after twenty-four hours. There is no gas formation.

In saccharose cultures there is no fermentation.

On fresh-potato cultures after twenty-four hours there is generally apparently no growth or only slight moisture about the track of inoculation; after three days there is a light straw-colored growth which gradually becomes heavier and a little darker by the end of a week. Cover slips show that the organism grows well on this medium.

In bouillon cultures there is moderate clouding of the medium in twenty-four hours, with the formation of a light precipitate. No pellicle on the surface ever occurs. Dunham's solution is clouded in twenty-four hours with the formation of a slight sediment.

Neither in Dunham's solution nor in Smith's sugar-free bouillon is there any indol production.

The bacillus is pathogenic for mice, rats, and rabbits when injected either subcutaneously or intraperitoneally. White mice, when inoculated with one-half to 1 c. c. of a twenty-four-hour bouillon culture generally die within forty-eight hours, but may live three days. Post-mortem the organism may be obtained from the visceral organs, and from the heart's blood. When the same amount is injected intraperitoneally the animal dies generally in from ten to twenty-four hours. Post-mortem there is generally œdema of the abdominal walls and a little fibrin over the surfaces of the intestines. The organism may be obtained from the abdominal cavity, visceral organs, and heart's blood.

Manila gray rats when inoculated with one-half to 1 c. c. of a twenty-four-hour bouillon culture subcutaneously generally died on the third or fourth day. The organism may be obtained from the visceral organs, and sometimes from the heart's blood. When inoculated intraperitoneally with the same amount death takes place

n from twenty-four to thirty-six hours. Post-mortem there is a little fibrin over the ntestines. The organism may be obtained from the liver, and generally from the spleen and heart.

In rabbits subcutaneous inoculation of 1 c. c. of a twenty-four-hour bouillon culture generally causes death on the third day. At necropsy the vessels of the epicardium are injected; the vessels of the mesentery are also brightly injected; the gall bladder s swollen; there are small hemorrhages in the liver; the stomach and small intestine contain a small amount of mucus. The cæcum and large intestine are distended with apparently normal feces.

Intraperitoneal injection into rabbits causes death with a more marked peritonitis; otherwise the changes are the same as when the inoculation is made subcutaneously. The organism is found in greater numbers in the liver than elsewhere.

Four monkeys were fed for two weeks daily with a twenty-four-hour bouillon culture of bacillus dysenteriæ. Two of the monkeys were fed 10 grains of sodium bicarbonate previous to taking the bouillon culture. Three of the cases had at times a moderate diarrhea; at no time was there blood in their stools. Bacillus dysenteriæ was recovered from their stools. In the fourth case there appeared after about ten days' feeding a little mucus and blood in the stools for two days. Microscopical examination showed the trichomonas intestinalis, red blood cells and epithelial cells; no amœba nor bacillus dysenteriæ was obtained from the stools. The feeding was continued, but the stools became normal, and there was no further result.

Cats and dogs were injected per rectum with large amounts of fresh bloody mucus stools from acute dysenteric cases in which the bacillus dysenteriæ had been demonstrated. No dysentery was obtained and no change of note in the large intestine.

Cats were given enemas of bouillon cultures of bacillus dysenteriæ. Only slight diarrhea for a few days was produced. One cat was killed nine days after the injection. At necropsy there was no swelling of the mesenteric glands. On opening the large intestine the rugæ were seen well marked, the surface of the bowel bathed in a light layer of mucus. Microscopical examination showed only epithelium and epithelioid cells. There were no hemorrhages nor early ulcerations of the large bowel.

Subcutaneous injection of 1 c. c. into a Manila pony cause a rise of temperature in the neighborhood of 105° F. After a few days' illness the temperature decline to normal.

The virulence of the organism varies greatly in different cultures. The organism quickly loses its virulence when grown for any length of time on artificial media. Thus it will be seen that the disease acute specific dysentery can not be produced as such in animals any more than typhoid fever can.

We will now attempt to describe the type of dysentery which we have called acute specific dysentery.

ACUTE SPECIFIC INFECTIOUS DYSENTERY.

An acute infectious disease characterized anatomically by an extensive superficial necrosis of the mucosa, and by hyperplasia and hemorrhagic infiltration of the lymph follicles of the large intestine, with induration and thickening of its walls; by hemorrhagic swelling of the adjacent mesocolic glands; and often by parenchymatous changes in the other organs. The bacillus dysenteriæ is present in the acute stage of the disease, both in the discharges and in the superficial necrotic layer of the intestinal mucosa. Clinically the disease is marked by an acute onset, by very frequent mucous bloody stools, accompanied by intense tenesmus, and by an abrupt termination either in death (usually in from four to fifteen days), or by a gradual improvement, from which an early recovery takes place, or the disease may apparently pass into a subacute stage.

Etiology.—The disease seems widely spread over the Island of Luzon, but has occurred particularly among our troops in certain districts. The cases often appear in groups. It is not the rule to find sporadic cases. In one regiment in which in the neighborhood of twenty cases of typhoid fever occurred within a short space of time, there were almost twice that number of acute specific dysentery cases within the same space of time, as verified by the clinical histories and by the blood serum reaction. It is not possible for us to say just now if the disease is spreading to any great extent. The conditions under which our troops are living are very different from what they were last year, the troops all practically being in garrison now. The disease appears to occur more frequently toward the end of the rainy season. Thus in the latter part of July and in August and September, 1899, there were more cases which came to necropsy with this type of the disease than in the remaining nine months of the year together.

Infection.—Infection probably occurs, generally, through the drinking water. Milk is a possible means of infection, but not a practicable one here, owing to the

scarcity of cows' milk in the Philippines and to the little use of other fresh milk as food. Infection through uncooked food (salads, cresses, etc.) can not be excluded. Undoubtedly infection is markedly influenced (as in cholera) by the existence of catarrhal troubles, irritating food, bad food, constipation, starvation, physical exhaustion, exposure to wet, etc. Infection with malarial plasmodia can hardly be considered an important predisposing factor, for it occurred in only two of our acute and in only one of our subacute cases.

The bacillus dysenteriæ.—The researches of Shiga have shown that a bacillus similar to, if not identical with, the one we have described above is probably the cause of a certain form of acute dysentery in Japan. Our own researches seem to show that this organism is probably the etiological factor in the acute specific form of dysentery which occurs here, and which we are attempting to describe. We have isolated this bacillus from 28 cases of dysentery. Nineteen of these cases came to necropsy, and all showed similar lesions of the large intestine, to be described below. This bacillus was isolated in 17 of our 21 necropsies on acute dysenteric cases. In our first acute case it was not sought for; in the remaining two it was not found. In our subacute cases it was obtained twice out of 11 necropsies. In two cases it was unfortunately not looked for. In the other seven it was not found. We shall refer again to the difficulty in finding the bacillus in the later stages of the disease.

The organism has been sought for in normal stools in the contents of the large intestines of those dying from other diseases than dysentery and in the fæces of monkeys and rabbits, but has never been encountered on any of these occasions. In 26 cases of dysentery which presented post-mortem an entirely different anatomical picture of the large intestine, and in all of which amœbæ dysenteriæ were present, this bacillus was carefully sought for and never found. Lastly, the disease has been produced in man on one occasion by inoculation with this organism.

Serum reaction.—The blood serum of the acute and subacute cases shows usually a marked agglutinative reaction for this bacillus. The reaction may be present as early as the third day, and is usually marked by the fifth or sixth. In one grave acute case which died on the fourth day of the disease, there was no reaction with the serum, either ante or post mortem, with this organism. The reaction may persist for several months, but usually seems to disappear in a shorter time. In one case of our series it persisted for six months, but has since disappeared.

General description.—The period of incubation probably lasts not over forty-eight hours. In one case to be referred to later, in which a pure culture of the organism was swallowed, symptoms of the dysentery began to appear after twenty-four hours. The onset of the disease is usually abrupt, there being no prodromal symptoms generally. Often a patient goes to bed feeling perfectly well. During the night he is suddenly attacked with dysentery, and it is not infrequent for these cases to have from 20 to 40 stools during the night. The stools at first contain a small amount of mucus. This mucus rapidly increases in amount, however, and soon becomes blood streaked. Generally within forty-eight hours, or a shorter time, the stools consist of nothing but reddish, bloody mucus. Microscopically these discharges consist in the later stages of many red blood cells, leucocytes, epithelial cells, and large epithelioid cells. No amœbæ are present in unmixed infections. The movements increase in frequency until finally there appears to be no control whatever over the sphincter ani, and the patient is almost continually on the bed pan or pad. The straining and tenesmus are often excessive. Toward the end the movements become less frequent, and may cease altogether shortly before death. Extensive hemorrhages are very unusual, but occasionally occur, always mixed, however, with more or less mucus. Excessive thirst is usually a prominent symptom. The tongue is generally coated with a whitish fur.

Fever.—The temperature is very irregular and variable, though almost always there is some pyrexia present. It may often reach 103° or 104° F. or it may not rise above 102° F. Just before death the temperature may rise rapidly or it may fall as rapidly to a subnormal point. The latter is always a very unfavorable sign.

The blood changes are not constant. There may be a moderate leucocytosis, but in the rapidly fatal cases often the number of leucocytes is not increased. The red blood cells in the first forty-eight hours are often increased in number, doubtless due to the early loss of water through the bowel; but shortly after the appearance of blood in the stools, notwithstanding this concentration of the blood, the blood count from the corresponding loss of red cells may fall below 4,000,000 to the cubic millimeter. Differential counts show that when a leucocytosis occurs it is the polymorphonuclear variety of white cells which is increased in number.

Pulse.—The pulse in the early stages of the disease is in the neighborhood of 100. As the disease progresses, particularly in unfavorable cases, the pulse becomes very rapid and may reach 150 or more. The extremities become cold, and the patient generally dies in coma from cardiac exhaustion.

Cardiac complications are rare. Neither acute endocarditis nor pericarditis has occurred in any of the cases studied. In the grave cases the sounds early become rapid and feeble and running. They soon lose their normal rhythm and approach that of embryocardia.

Nausea and vomiting are also somewhat uncommon, but occasionally occur, particularly in the earlier stages of the disease. Acute gastritis was found to be present in one subacute case at necropsy. There is often abdominal tenderness, particularly about the region of the colon, on deep pressure. No particular part of the colon appears constantly more tender than the rest. The abdomen is generally not distended. The spleen is generally not enlarged.

Respiratory system.—Pulmonary complications have been occasionally present. Lobar pneumonia occurred in one subacute case, and broncho-pneumonia in three acute and one subacute case. Acute bronchitis and fibrino-purulent pleurisy have been found each once in two of the acute cases of dysentery.

Nervous system.—There is no complaint of intense headache. Delirium may occur toward the close, particularly in the prolonged fatal cases. Convulsions have not been noted in any case, nor has neuritis or paralysis been observed as a sequel.

The urine is always decreased in amount, and may contain a small amount of albumin. Retention is often an early symptom. The diazo reaction does not occur. Acute glomerular nephritis has been found post-mortem in one case.

In none of our cases has the liver been found much enlarged or tender. It is perhaps hardly necessary to mention that liver abscess has not been found in this form of dysentery.

Recovery from the most severe form is rare; in those cases which recover, the loss of weight may be very marked; a loss in the neighborhood of 20 or 30 pounds may occur within two weeks. The patients, after the acute form, are generally left in a weakened state. After convalescence has been established, they do not seem to suffer from dyspeptic or intestinal troubles. One attack does not necessarily protect, for one of our cases writes to us from a distance that he has had an attack similar to his first, which was a severe one and studied clinically by us. The second attack occurred five months after the first. Convalescence had been long established between the two. The most violent stage of the disease rarely lasts a week, though patients have lived for ten days in this stage. We have referred before to the fact that the cycle of this type is different from that of the amœbic type of dysentery. In the former it is brief; thus of our 21 acute cases which came to necropsy, 4 died on the fourth and 4 on the fifth day of the disease. None of our cases died before three complete days of illness. Ten others died before the fifteenth day. In those cases which recover, the urgency of the symptoms gradually diminishes, the stools gradually lessen, and the temperature declines. Recovery then may be early and convalescence well established by the end of the second week, or the disease may sometimes become subacute and last for months. One of our cases died on the sixty-fourth day of the disease. We regret that we have not as yet studied clinically this subacute stage as carefully as we should wish. These patients are usually poorly nourished, and have thin, bloody mucous stools from time to time—often not over from 3 to 5 in twenty-four hours. These stools in unmixed infections do not contain amœbæ. The blood serum of these cases shows a well-marked agglutinative reaction with the bacillus dysenteriæ, and sometimes an agglutinative reaction with certain colon bacilli, particularly for varieties of colon which show feeble power to ferment sugars, and which only faintly redden litmus milk without coagulating it, and which perhaps should be more correctly referred to as para-colon bacilli. These subacute cases, with their serum reactions, will be more fully described in a later paper.

Association with other diseases.—In 2 cases of the acute form of this dysentery there has been concurrent infection with malarial fever—on one occasion with the æstivo-autumnal type, and on the other with a single tertian infection. One subacute case was associated with a single tertian infection also. In another subacute case at necropsy there was a pigmented malarial spleen, but no parasites were present. In none of the other cases were malarial parasites found. So much has been said about malaria as an exciting agent in dysentery that we take occasion to emphasize the fact that it did not play an important part as a predisposing factor in our cases in this form of dysentery.

MORBID ANATOMY.

Abdominal cavity and intestines.—On opening the abdominal cavity the intestines externally may appear at first sight almost healthy. In a large majority of cases, however, the mesenteric vessels of the large intestine near the bowel are injected. The lymph glands lying close along the upper end of the rectum and the sigmoid flexure, which are normally hardly visible or palpable, are swollen to the size of from 10 to 15 mm. in their long diameter, are generally bright red, and on cut section hemor-

rhagic. No areas of necrosis are visible. The other lymphatic glands extending along the large intestine may throughout show these same swollen hemorrhagic changes, or they may along the transverse and ascending colon show only considerable hyperæmia. The group running toward the head of the pancreas seems particularly likely to be involved. The other mesenteric lymphatics are often only moderately swollen, and sometimes show slight hyperæmia. We have not noticed either any constant marked distention or contraction of different portions of the large intestine.

The serous surfaces of the large bowel are generally injected. The serous surfaces of the small intestine may be moderately injected or appear almost normal. The submucous and muscular coats of the large intestine are œdematous and swollen. The blood vessels of the submucosa are injected and in places diffuse hemorrhages have occurred in their regions.

On opening the intestines the whole of the large intestine is seen to be involved from the cæcum to the anus. Occasionally the process extends for 10 or 15 cm. into the lower end of the ileum. In regard to the starting point of the infection, we can not say, from the pathological changes post-mortem, in what part of the intestine the morbid process probably begins. The process seems a little more acute along the lower part of the descending colon and the sigmoid flexure, judging from the fact that the glands of the lymphatic chain which lie close to the bowel are generally more hemorrhagic than the other lymphatic glands of the large intestine.

In no text-book at hand can we find a description of this form of acute specific dysentery as we see it here. In the most acute cases (death after three or four days' illness) the mucous membrane of the large intestine presents in general a reddened, swollen, puffy appearance. There is a superficial necrotic mucous layer which generally extends over the mucosa throughout the large bowel, and sometimes for a distance of 10 or 12 cm. into the ileum. This necrotic layer consists of mucus, redblood corpuscles, leucocytes, epithelial cells, many large swollen epithelioid cells, and bacteria. No amœbæ are found. If one brushes the mucous layer lightly aside with the finger the bright-red injected appearance of the intestinal wall becomes more plainly visible. Dotted here and there throughout are small, diffuse, bright-red hemorrhages, with irregular margins measuring 2 to 4 mm. in diameter, or even more. The solitary follicles are generally swollen and raised, and of a bright-red color. Here and there scattered among them bright-red, sharply circumscribed small purpuric spots may appear. Occasionally the background of the intestine may be described as though covered with a bright-red eruption, but with darker red hemorrhagic points scattered over this background. In the acute cases no definite ulceration takes place, but only a superficial general necrosis of the mucosa.

Small intestine.—As has been stated, the serous surfaces may be moderately injected or appear almost normal. On opening the small intestine the mucous surface throughout may be normal, or more commonly the mucosa in the lower portion of the ileum is more or less reddened. In about one-third of the cases (7 of the 21 acute), however, the lower 10 or 15 cm. of the ileum is extensively involved. When this is so this portion of the intestine presents in general the same reddened hemorrhagic appearance and is covered with a necrotic mucous layer as in the large bowel. There is not the œdema and thickening of the intestinal walls here, however, as observed in the large intestine. The Peyer's patches are only moderately or not at all swollen; the solitary follicles may be swollen (measuring 1 or 2 mm. in diameter), raised, and hemorrhagic. The process gradually fades until usually about 15 or 20 cm. above the valve the mucosa appears normal. The process is never so well marked in the lower end of the ileum as in the large intestine. In only one case was there found a sticky, fresh, fibrinous peritonitis, with fine filaments of fibrin, particularly over the sigmoid flexure and upper part of the rectum.

The other organs show no constant changes.

Spleen.—The spleen is generally not enlarged and shows no constant pathological change. It was moderately swollen in 5 acute and in 2 subacute cases. In 4 of these 7 the enlargement was probably due to the coexisting malarial infection.

Liver.—The liver is not generally either hyperæmic or swollen. In only 1 case was it congested, and in another case slightly enlarged. In 2 cases there were small superficial hemorrhages beneath the capsule.

In no case has liver abscess been present. In those cases which live for more than a few days the liver shows parenchymatous changes. In the subacute stage it may show early fatty degeneration.

Kidneys.—The kidneys often show injection of the surface vessels and cloudy swelling. Acute glomerular nephritis was present in the 1 subacute case. The dysentery was associated with chronic interstitial nephritis in another single subacute case.

Stomach.—Acute gastritis was present in only 1 subacute case. The heart muscle showed parenchymatous changes in 3 acute and in 1 subacute case.

Respiratory system.—Lobar pneumonia was present in 1 subacute case. Broncho pneumonia was present in 3 acute and in 1 subacute case. Table III shows the more common changes in all the dysenteric necropsies.

TABLE III.

[Total number of necropsies, 271.]

Necropsies.	Total number.	Liver abscesses.	Acute general peritonitis following perforation of intestines.	Typhoid fever.	Malarial fever.	Pigmented malarial spleen.	Acute gastric catarrh.	Chronic gastric catarrh.	Lobar pneumonia.	Broncho pneumonia.
Dysentery	111	14	13	3	6	6	3	8	2	9
Acute specific dysentery	21	.....	.....	.....	2	.....	.....	2	.....	3
Subacute specific dysentery	11	.....	.....	.....	1	1	1	1	1	1
Amœbic dysentery	79	14	13	3	3	5	2	5	1	5

Necropsies.	Acute pleurisy.	Chronic adhesive pleurisy.	Congestion and œdema of the lungs.	Acute nephritis.	Chronic nephritis.	Cloudy liver.	Cloudy kidneys.	Fatty liver.	Fatty kidneys.	Cirrhosis of liver.	Enlarged spleen.
Dysentery	3	25	16	2	7	36	21	26	7	5	15
Acute specific dysentery	1	.....	4	.....	.....	8	5	1	1	.....	5
Subacute specific dysentery	.....	7	1	1	.....	7	4	3	3	.....	2
Amœbic dysentery	2	18	11	1	7	21	12	22	3	5	8

As has been stated, the bacillus dysenteriæ may be obtained from the superficial necrotic layer overlying the large intestine, from the superficial layers of the mucosa itself, and exceptionally (in 2 cases) from the hemorrhagic mesocolic glands.[1] The organism has not been found elsewhere in the body.

In the subacute form the mucosa of the large intestine has lost its bright-red look. The solitary follicles are more swollen, sometimes measuring as much as 5 or 6 mm. in diameter, are raised, hemorrhagic, and of a dark-red color. Irregular dark hemorrhages may be seen in their neighborhood. The surface of the bowel is very uneven, due apparently to the irregular thickening of the mucosa. The mucosa may take on a marked mammillated appearance. The necrotic layer of mucus is much less profuse than in the acute stage of the disease. There are still no definite ulcers, but there are superficial erosions. Indeed, we have never seen anything in this form similar to the ulcerations present in our dysenteric cases in which the amœba dysenteriæ has been found present. There is not the same thickening of the intestinal walls seen in the acute cases. The submucosa and muscular coats seem to have lost some of their œdema. The lower end of the ileum was extensively involved in 4 of the 11 cases. In 1 of these the process extended for a distance of 85 cm. into the small intestine above the ileo-cœcal valve. In 3 other cases the mucosa of the lower end of the ileum showed only hyperæmia.

The parenchymatous changes in the organs are more marked than in the acute form. Fatty degeneration of the liver and kidneys were present in 3 of the cases.

PATHOLOGICAL HISTOLOGY.—*Large intestine.*—Sections of the large intestine show overlying the mucous membrane a necrotic layer of mucus, degenerating epithelial cells, a few large swollen epithelioid cells, red blood corpuscles, and leucocytes. The whole stains poorly; many cells are granular and have lost their nuclei; as one approaches the bases of the glands of Lieberkuhn the cells stain more deeply. Always bacilli and not infrequently cocci are present in this layer. The number of

[1] Since writing the above the organism has been obtained in cover slips and in pure cultures from the lymphatic glands of a third case of the acute type.

red blood corpuscles varies greatly with the time of the disease. In the most acute cases they may greatly overnumber the white corpuscles and epithelial cells. The surface epithelium of the glands has been destroyed; in some cases where the process is most severe the epithelium may be necrotic almost to the base of the glands. The mucous membrane or what is left of it is swollen, its capillaries are distended, and there are small extravasations of red blood cells in their regions. The mucosa shows extensive cellular infiltration and there are many leucocytes in both the inter and sub glandular tissues. The bacilli in the mucosa lie scattered or collected within the glands or between them or sometimes within the cells of the glands. When they are found aggregated there are often collections of leucocytes about them. Some of the cells in their neighborhood are granular and their nuclei stain poorly. Sections which are cut through a follicle show the follicle swollen, with often small hemorrhages into its substance; large epithelioid cells are sometimes present in the adjacent lymph channels; these are then often multinuclear; bacilli may be present in the follicles, when both circumfollicular and interfollicular infiltration may occur. In the mucosa we sometimes find in addition to bacilli dysenteriæ a fair number of cocci. These latter, however, are generally in the more superficial layers of the mucous membrane when present.

At the base of the glands of Lieberkuhn in the areolar tissue and muscularis mucosæ there are usually more extensive hemorrhages and a marked infiltration with round cells. Also in the upper portion (from within) of the submucosa there are extensive hemorrhages. In the lower portion of the submucosa the vessels are injected, but the hemorrhages not large or frequent. Where the thickening of the intestinal wall is more marked the hemorrhages and cellular infiltrations in the submucosa are more extensive. Often the tisues of the submucosa appear very œdematous. Sometimes there is an apparent increase in the number of the plasma cells in the upper portion of the submucosa when the infiltration seems most marked. Even in the muscular coats the œdema may sometimes be present, and in very severe cases infiltration may occur. The vessels of the peritoneal coat are injected, but there are generally no large hemorrhages. The bacilli may be found sometimes not only in the mucosa, but all through the areolar tissue, muscularis mucosæ, and submucosa down to the muscular coat. In their neighborhood when they lie in masses there is infiltration, and often the nuclei of the cells about them stain poorly and are granular.

The lymphatic glands.—Sections of the swollen hemorrhagic glands show the blood vessels greatly distended, and there are often extensive hemorrhages through the gland substance. The lymph spaces are frequently distended and contain albumin and a little fibrin; there may be many large epithelioid cells with proliferating and multiple, often crescent-shape, nuclei. Desquamation of the cells along the lymph channels may occur. The lymph follicles are proliferating and show an increase in the number of small round cells; often there are small hemorrhages present in the follicles. Only occasionally one sees a poorly staining and granular cell. In the surrounding tissues about the glands the blood vessels are distended. In only one case do the sections of the lymph glands show bacilli. (In the other case in which the bacillus was obtained by cultures from the glands, through some mistake no glands were saved for microscopical study.) In these glands small areas of necrosis have occurred. In these areas granular material is present; the nuclei stain poorly, but no nuclear fragmentation is apparent about the organisms. There is only moderate infiltration about these areas.

The liver.—Sections of the liver tissue show the liver cell often swollen and containing fine granules; the normal structure of many of the cells is lost. No areas of necrosis or of infiltration occur.

The kidneys.—Usually the vessels are injected, the tubules sometimes filled with red blood corpuscles. In the glomerular spaces it is not uncommon to find a little albumin with extravasation of red blood corpuscles. The cells of the tubules are generally swollen and granular.

The spleen.—Shows no definite changes with the exception that the pulp usually contains more red blood corpuscles than normally. The more detailed description of the microscopical pathology will follow later.

SERUM REACTIONS.—In 246 cases of diarrhea and dysentery, without regard to type, the blood serum was examined for agglutination with bacilli dysenteriæ. Of this number 71 cases had a positive agglutinative reaction with this organism in dilutions of 1 to 10 in twenty minutes.

In 192 of the 246 cases the stools were examined microscopically with the following results: In 56 the amœba dysenteriæ was found, often with the trichomonas intestinalis; in 4 the amœba coli; in 29 cases either the trichomonas intestinalis or the cercomonas hominis or both were present; in one case each the balancidium coli,

the rhabditis embryos of the strongyloides intestinalis, ova of the anchylostoma duodenale, and ova of the trichocephalus dispar were found.

In 54 cases the stools were unfortunately not examined. This happened chiefly because the blood in these cases was often obtained from other hospitals at a distance. Many of them were undoubtedly amœbic cases. In 33 cases the serum showed no agglutinative reaction with bacilli dysenteriæ, nor were parasites found in the stools. Of these 33, 1 was a case of sprue previously seen by Manson, 3 turned out to be typhoid fever cases, and 2 gave positive serum reactions with bacillus coli communis. A small number of these 33 were probably amœbic cases, as sometimes it was impossible to make more than one examination of the stools among them.

All of the 71 cases of this group of cases which gave a positive agglutinative reaction with bacilli dysenteriæ either gave a recent clinical history or were suffering at the time from an acute dysentery. In many the dysentery was severe and ended fatally. In fact, in 21 of these cases bacillus dysenteriæ was sought for and obtained from the stools.

In only 3 of the cases with positive serum reactions for bacillus dysenteriæ were amœbæ found in the stools. In 2 others the trichomonas intestinalis was found, but no amœbæ. Of the cases which gave the serum reaction and contained amœbæ in the stools the first was undoubtedly suffering from amœbic dysentery at the time, but he gave the following history twelve days previously: "The attack came on suddenly; three other companions were taken sick with dysentery at the same time; all were drinking the same water and eating the same food at Pasig. The first twenty-four hours his bowels moved all night; he sat at the sink off and on for two days. He complained of swimming in his head and had bloody mucous stools. He entered this hospital twelve days later, stating that his dysentery was much improved." Numerous motile amœbæ, many containing red blood corpuscles, were found in his yellow mucous stools. Bacillus dysenteriæ was sought for but not found. The blood serum showed a distinct positive agglutinative reaction for bacillus dysenteriæ. He improved and disappeared from the hospital. In this case it does not seem clear just when the infection with amœba took place.

In the second amœbic case which gave an agglutinative reaction with bacillus dysenteriæ, the following clinical history of dysentery was obtained: "Perfectly well all his life until six months ago, when he was taken sick with diarrhea, which lasted for a week or so at a time, when he would get it stopped, but it would begin again in a short time. This intermittent diarrhea continued until a short time ago, when it became more severe, and he noticed that he was passing considerable blood; his stools became more frequent—10 to 15 in twenty-four hours—with more tenesmus and with headache and fever. He entered the hospital shortly after." The first twenty-four hours after entrance he had 20 stools, the second 26, and the third 16 stools. His temperature registered for two days 101° F., and then gradually dropped to normal. There was a leucocytosis on the second day of 10,000. The mucous stools showed many red corpuscles, epithelial cells, motile amœbæ, some containing red blood corpuscles and bacteria. The blood serum reaction (1 to 10 in fifteen minutes) with bacillus dysenteriæ was repeatedly obtained. Bacillus dysenteriæ was not sought for in the stools. The blood serum showed no agglutinative action with a colon bacillus obtained from his stools.

The third case which gave both a positive blood serum reaction with bacillus dysenteriæ, and had also amœbæ present in the stools, gave the following history of dysentery: "Three months ago he had a severe attack of acute dysentery with very frequent bloody stools containing mucus; this attack lasted about seventeen days; he gradually grew better and the blood began to disappear, but he states that he never has been free of diarrhea or dysentery since. About a month after his first attack of dysentery he had another severe acute attack; this lasted about eight days; he again passed large quantities of blood and mucus and states he had chills and fever at the same time. He has been passing blood and mucus off and on ever since." He entered the hospital here for his chronic dysentery and for cramps in his bowels. Since entrance he has had never more than 5 stools in twenty-four hours. Examination of the yellowish pea soup like stools shows large numbers of the trichomonas intestinalis, a fair number of motile amœbæ, a few containing red blood cells, a few red blood corpuscles and leucocytes. The blood serum shows a moderate but distinct agglutinative reaction for bacillus dysenteriæ, but none for the bacillus coli communis. The blood examination shows a few crescentic malarial parasites. The amœbic infection here occurred perhaps after the first acute attack of dysentery.

We regard these 3 cases as double infections with bacillus dysenteriæ and with amœba dysenteriæ.

In the first 120 cases of the 246 (in which there were 15 positive agglutinative

reactions with bacilli dysenteriæ) the blood serum was also tried for agglutinative reaction with bacillus typhosis; with only 3 were there positive results. In the first of these cases the patient had typhoid fever four months before, and in the second case the patient had typhoid fever the previous year; in the third case we do not know whether there was any history of typhoid or not; we are endeavoring to trace the patient and obtain this information. In 46 cases in which the blood serum gave a positive reaction for bacillus dysenteriæ, the blood was examined for malarial parasites. They were found present in 9 cases. There were 4 tertian and 5 æstivo-autumnal infections. It will be seen again that malaria is apparently not a predisposing factor of importance in this form of dysentery.

The blood serum was also tried in 100 cases other than dysentery for agglutination with bacillus dysenteriæ, with the following results:

Disease.	Number of cases.	Previous hist. dysent.	Dilution.	Time.	Result.
		Cases.		*Minutes.*	
Health	12	1	1:10	30	{1 partial. 11 negative.
Malaria	17	.....	1:10	30	Negative.
Typhoid	20	.....	1:10	30	Do.
Surgical	17	1	1:10	30	{1 positive. 16 negative.
Venereal	4	.....	1:10	30	Negative.
Rheumatism	6	.....	1:10	30	Do.
Tuberculosis	3	.....	1:10	30	Do.
Paraplegia	1	.....	1:10	30	Do.
Abscess	3	.....	1:10	30	Do.
Acute mania	2	.....	1:10	30	Do.
Constipation	1	.....	1:10	30	Do.
Diarrhea	7	.....	1:10	30	Do.
Bronchitis	2	.....	1:10	30	Do.
Dengue	4	.....	1:10	30	Do.
Sprue	1	.....	1:10	30	Do.
Total	100	2	1:10	30	[1]

[1] 1 positive, 1 partial, 98 negative.

Of these 100 cases, 1 gave a positive and 1 a partial reaction with bacillus dysenteriæ. The case that gave a complete reaction had never had typhoid fever. In 1895 he had severe dysentery in India, lasting about six months, and was unconscious during the first part of the attack. In 1898 he had a second attack of severe dysentery in South Africa; this attack lasted three weeks. At present he has no dysentery and has not had any for more than a year. The blood examination is negative for malarial parasites. The blood serum shows no agglutinative reaction for bacillus coli or for bacillus typhosis.

The case which gave a partial reaction for bacillus dysenteriæ (tried three times) gave also a negative reaction for bacillus typhosis and for bacillus coli. This patient gives a history of "an acute attack of dysentery one year ago which lasted about ten days. He passed much blood and mucus then and had many stools." He has had no bowel trouble since.

The dilutions of blood serum used may be considered rather low for the time limit, but these 100 reactions seem to show that the agglutination does not occur with ordinary blood serum in these dilutions.

In 97 of the cases the blood serum was tried for agglutination with bacillus coli communis or varieties of it (paracolon bacilli). Twelve of these gave a positive reaction in dilutions of 1 to 10 in twenty minutes. In 3 of these cases the blood serum also gave a positive agglutinative reaction with bacillus dysenteriæ; they were all clinically regarded as subacute cases of dysentery. In the 11 other cases in which the positive reaction for colon bacilli was obtained, 2 were cases in which there was clinically subacute dysentery, but no serum reaction for bacillus dysenteriæ and no parasites in the stools; 2 were cases of amœbic dysentery, and 5 were cases of a history of dysentery but with no dysentery at the time, and with the trichomonas intestinalis only in their stools. None of these last 11 cases, it is understood, gave a positive reaction with bacillus dysenteriæ.

So far we have not obtained the bacillus dysenteriæ from the intestine or from the stools in an amœbic case of dysentery; however, it has only been sought for in 26 cases as yet. We must remember, though, that the acute specific dysentery runs a rapid course, that cases either die quickly or get better rather quickly. And we have already pointed out that it may be very difficult, nay, we should say often impossi-

ble, to obtain bacillus dysenteriæ in any but the most acute stage of the disease. This only adds therefore to our chances of not finding it in amœbic cases and explains perhaps why we do not more often meet with double infections. Undoubtedly cases of these double infections with amœba dysenteriæ and bacillus dysenteriæ occur, as are evidenced by the 3 cases reported above in which the blood serum reacted positively to bacillus dysenteriæ and in which amœbæ dysenteriæ were found in the stools. But to find the bacillus dysenteriæ in an undoubted amœbic case we have not been fortunate enough to do. We can not speculate upon the anatomical picture the large bowel would present at necropsy, for it is somewhat doubtful if bacillus dysenteriæ would attack an already diseased, thickened bowel, which we often see in amœbic cases, in the same manner it would a more normal mucosa. We do not doubt that these cases of double infection occur, however, and we shall hope still to meet with one. As has been stated, we have examined only 26 cases. The cases in which amœbæ dysenteriæ have been found in the stools and the blood serum gives a positive agglutinative reaction for the bacillus dysenteriæ are to be regarded as double infections, just as we have infections with other bacteria and parasitic diseases at the same time (for example, infection with the amœba dysenteriæ and bacillus typhosis, of which we have had 3 cases, and we know from Cunningham's work that in some cholera cases both the comma bacillus and amœba coli occur in the large intestine together). We do not believe that the two are to be taken as part of the same infection. The two parasites produce quite distinct lesions. The bacillus dysenteriæ produces its changes rapidly and has an acute cycle; the amœba dysenteriæ produces its lesions slowly usually, and death comes generally only after prolonged infection with this parasite.

In 56 amœbic dysentery cases in which amœbæ dysenteriæ were found in the stools, in only 3 cases was there a positive serum reaction with bacillus dysenteriæ. The two diseases, amœbic and acute specific dysentery, have a very distinct and different etiology.

Preliminary note.—We spoke in the beginning about the clinical cycle of amœbic dysentery being somewhat different from that of our acute specific dysentery. Thus in amœbic dysentery we often have an irregular course marked by periods of intermission and exacerbation of the diarrhea with a tendency to chronicity and the frequent occurrence of abscess of the liver. A gradual onset is characteristic of most of the cases, although the onset may occasionally be abrupt.

The periods of exacerbation and intermission of the diarrhea are characteristic of this form of dysentery. Are we not justified, then, in saying that the clinical cycle of the two forms of dysentery is generally different? Only a few days ago a patient was admitted who stated that he had been troubled with dysentery only for a week, and not before that time. He died the next day. Motile amœbæ were found in the stools before death and in the lesions of the large intestines post-mortem. There existed most extensive ulceration of the large bowel. Some of the ulcers were already healing. The process must have existed for a month or two at least, yet there was no other history than of a moderate dysentery of a week.

The amœbic cases.—Seventy-nine of our necropsies on dysenteric cases presented the lesions of amœbic dysentery. Almost every variation of the disease was observed. In general, many showed extensive thickening of the large bowel with numerous soft, deeply undermined, ragged-edged ulcers, often somewhat raised above the surrounding mucosa from infiltration of the underlying submucosa. The bases of these dissecting ulcers were formed of mucosa, submucosa, muscular tissue, or peritoneum. Other cases showed ulcers with only slightly undermined edges with smoother borders and clean bases. In many, both healing and fresh lesions were observed. The bowel wall was generally either bluish red or slaty gray. General peritonitis following perforation of the large bowel was present in 12 of the series. We can not attempt to describe these lesions of this type of the disease here. They have been carefully and fully described by Councilman and Lafleur (the Johns Hopkins Hospital Reports, Vol. II, 1891), Kruse and Pascale ("Untersuchungen uber dysenterie und leberabscess," Zeitschr. f. Hygiene, Bd. 16, Heft 1, 1894), Harris (American Journal of the Medical Sciences, 1898), and others. Anyone who reads their descriptions must clearly see that the anatomical picture we have attempted to describe, as found in our acute and subacute cases, is entirely a different one from the picture of amœbic dysentery. Their descriptions answer well for the pictures we have found in our amœbic cases and we have nothing to add to them.

In 68 of our 79 cases motile amœbæ were found in the lesions of the large intestines. (We emphasize the fact that the amœbæ were motile in these 68 cases; in other cases when the examination could not be made soon after death sometimes bodies resembling amœbæ, but not motile, were found. Swollen epithelioid cells, as is well known, often closely resemble amœbæ. Without movement it is sometimes

very difficult to distinguish them from one another.) Fourteen of these cases showed, in addition to the lesions of the large bowel, liver abscesses, in which amœbæ were found in all but 2. In 1 the examination could not be made for nine hours after death. In 21 the lower end of the ileum was reddened. In 4 cases there were typhoid ulcers. In only 3 cases could the dysenteric process be said to be present. Then there were no ulcerations, but reddening of the mucus and swelling of the solitary follicles.

We were not able to study in all of the amœbic cases the bacteriology of the large intestine. The routine work of the laboratory has at times been such as to render this impossible. In 26 of these amœbic cases, however, the bacteriology of the large intestine was carefully studied and the bacillus dysenteriæ sought for, but not found in one case.

The bacillus lactis aerogenes and several varieties of streptococci and staphlycocci were the only other organisms found oftener than occasionally. We may add here that in none of these 26 cases did the blood serum give an agglutinative reaction with bacillus dysenteriæ.

We shall not be surprised to find bacillus dysenteriæ in connection with an amœbic dysenteric case, for we believe, as we have stated, that such double infections occasionally do exist, as shown by our blood serum reactions. When this occurs, however, we shall hope to find, in addition to the lesions of amœbic dysentery, those of acute specific dysentery, of course greatly modified, as one might expect in a case of concurrent infection with bacillus dysenteriæ and amœba dysenteriæ.

In none of these 79 cases of amœbic dysentery did the picture resemble the acute or subacute stage of our specific dysentery.

Councilman and Lafleur (loc. cit.) first called attention to the fact that amœbic dysentery is an anatomically sharply characterized form of the disease. Amœbic dysentery, they write, "is a form of dysentery which etiologically, clinically, and anatomically should be regarded as a distinct disease." We can only add that our own work bears out this statement. Yet it is with great difficulty that this view has held ground, and at present there is still much opposition to it. Thus when we consult two of our recent well-known text-books we find in Allbutt's System of Medicine, Volume II, page 408, 1897, that amœbic dysentery is recognized as a separate type of the disease and is described in a different chapter, and we find the statement under dysentery as an endemic infection, "that such specific organisms do exist in dysentery can hardly be doubted by those who have witnessed dysentery in its epidemic or endemo-epidemic manifestations; but until their existence is demonstrated, they can not be used as a basis of classification." On the other hand, when we consult the Twentieth Century Practice of Medicine, volume 16, 1899, we find that Sodré states, "To admit a dichotomy in the morbid process to recognize the existence of an amœbic dysentery and another not amœbic, seems to me absolutely unacceptable. Dysentery is one and one only, whether it be considered from an etiological, clinical, or anatomical point of view. * * * It is always the same, whether observed in the tropics as endemic and with marked tendencies to become chronic or in temperate regions as sporadic or epidemic." We can not agree with this statement. There are many instances to show that there may be more than one variety of dysentery. One of the most striking examples, clinically, of this, it seems to us, occurred in Futuna. Davidson (Epidemic in Futuna, Hygiene and Diseases of Warm Climates, Edin., 1893, p. 997) states that in 1893 an epidemic of dysentery started in Futuna, one of the New Hebrides group, being introduced by a vessel from Sidney (1,400 miles distant) which landed a Futunese woman and child. The child was suffering from dysentery. The disease soon spread and carried off one-quarter of the population, chronic dysentery being endemic in this island before the epidemic started. Our own experience has shown us that certainly at least two distinct forms of dysentery exist here. Both have probably the same predisposing factors (namely, dyspeptic conditions, particularly those caused by the ingestion of bad or irritative food, overripe or unripe food, sudden changes of temperature, exposure to wet and cold, etc.), but the one is caused by infection with the bacillus dysenteriæ and the other by infection with the protozoon amœba dysenteriæ. Also, the amœbic form is the endemic form of dysentery here, and the cases occur throughout the year. The specific form is more likely to appear as epidemic, and particularly in the late summer or fall of the year. At the present time, however, the troops at Calamba are suffering from a severe epidemic of this latter form.

Since there has been so much controversy in regard to the amœba as the cause of dysentery, let us review briefly the literature in regard to this parasite. According to Sodré (loc. cit.) Lambl was the first to note the presence of amœbæ in the contents of the intestines. He observed them in 1859, in Prague, in the stools of a child affected with dysentery. Lewis and Cunningham (Quarterly Journal Microsc. Soc.,

Vol. XXI, 1881) found them in India in cholera stools and in other faeces. Loesch (Virchow's Archives 65), however, was the first to accurately describe them and give them the name of amœba coli. He found them in the stools of a case of human dysentery in Russia in large numbers, and was able by rectal injection of the fæcal material loaded with amœbæ to produce ulcerations in the large intestine of dogs. In these ulcers he found large numbers of amœbæ.

The presence of amœbæ in the stools in diseases of the large intestine was corroborated by Sonsino, Normand, Grassi, Leuckart, and others. Koch (Koch and Gaffky "Arbeiten auss dem Kaiserl" Gesundheitsamte) then showed in several cases of Egyptian dysentery that amœbæ were to be found in the floors of the ulcers of the large intestine as well as in liver abscesses occurring in connection with dysentery. The regularity of these results was proven later by Kartulis (Virchow's Archives, 105–118; Centralblatt. f. Bakter., 207), by Professor Osler (Johns Hopkins Hospital Bulletin, 1890), by Councilman and Lafleur (Johns Hopkins Hospital Reports, 1891), by Kruse and Pasquale (Zeitschr. f. Hygiene u. Infekt., 16, 1), Harris (American Jour. Med. Sciences, 1898), and by others, who found them in a great number of Egyptian and American dysentery cases as well as in liver abscesses associated with some of these. Councilman and Lafleur stated that the name "amœba coli" given to the parasite by Loesch was not distinctive, for it seemed to them very probable that there were a number of species of amœba, which under certain conditions and in certain localities might inhabit the colon. They, therefore, proposed the name "amœba dysenteriæ" for it. On the other hand Ogata (Centralblatte f. Bakt., 11) and Maggiora (Ibid., 11) failed to find amœbæ in numerous cases of Japanese dysentery. Laveran (Archive de Med., 1893), Calmette (Archiv. de Med. Nav., September, 1893), Gasser (Archiv. de Med. Experim. et d'Anat. Path., 1893), Bertrand and Baucher (Gaz. Hebd., 1893 and 1894), Chaltin (Centralblat. f. Innere Med., 1894), and others also often failed to find them. Schuberg (Centralblatt. f. Baktr., 13), concluded that the abundance of the amœba in dysentery was the effect and not the cause of the disease. The ulcerations he states "afford this dweller of the intestine more favorable conditions for development." Cassagrandi and Barbagallo (Riecerche Biolog. e Clin. sul ameba coli Boll. de. Accad. di Catania, 1895) go so far as to say that the rôle of the amœba in a dysenteric intestine is to combat the microbe and "that they are a true guardian to man's health." The authors feel drawn to make this statement because they observed that amœbæ absorb bacteria at times and that bacteria are often rare in their neighborhood, in the ulcerations of the large intestine. The assertion that was first made by Cunningham (loc. cit.), viz, that amœbæ were found in other intestinal diseases as well as in normal stools, was demonstrated without doubt by the experiments of Grassi (Significo patolog. dei protozoi parasitti dell'nomo. Rendiconti Accad. Linc. Rom., 1888), Kruse and Pasquale (loc. cit.), and Schuberg (loc. cit.). However, Kartulis in reply to Grassi's communication asserted that the amœbæ found in Egpyt by him were not identical with those found in the faeces of healthy individuals in Italy. Kruse and Pasquale clearly recognized the difference between these two forms of amœbæ. Inoculation of dysenteric faeces containing amœbæ dysenteriæ into the rectum of cats has given positive results in the hands of Loesch (loc. cit.), Hlava (Centralblatt. f. Baktr., 1887), Kartulis (loc. cit.), Kovacs (Zeitschr. f. Heilkundr., Feb., 1893), Quincke and Roos (Berlin Klin. Woch., No. 45, 1893), and Kruse and Pasquale (loc. cit.). Stools in which the amœba was not present gave negative results. Nevertheless, to the objection made that it was the bacteria in the stools which caused the ulceration of the large bowel and not the amœbæ, Kruse and Pasquale injected into two cats the contents of two different liver abscesses containing motile amœbæ, but sterile as regarded bacteria by both cover slips and cultural tests. In both of these cases dysentery with ulcerations in the large bowel was produced. They also, in order to learn the importance of different varieties of bacteria which had been found in dysenteric faeces and organs, injected six different varieties of organisms into the rectum of cats. In five cases the results were negative. One experiment which had been made with streptococci resulted in the death of the cat, although no dysentery was produced, from a clear septicæmia. They also found that the amœbæ of nondysenteric stools when injected into cats produced no lesions and no dysentery. Roos (loc. cit.) in six cases performed with nondysenteric amœbæ obtained the same result, while in twelve experiments with dysenteric amœbic stools which had been injected partly by os and partly per rectum he obtained six cases of dysentery. Celli and Fiocca (Annali deli Instituto d'igiene sperimentale di Roma, 95) have made the statement that they have succeeded in breeding the amœba of dysentery, the amœba of the normal intestine, and many other varieties, but still not free from bacteria (comp., p. 601). Their statements are not convincing in regard to amœba dysenteriæ when one

looks at the description and diagram which they give. These amœbæ measured only from 4μ to 10μ in diameter, and were therefore of so small a size that they are hardly to be classified as dysenteric amœbæ. Dysenteric amœbæ may vary from 10μ to 50μ, but hardly below 10μ. They are generally considerably larger. Also these authors claim that when the dysenteric amœbæ were injected into the rectum of cats they obtained no results, but that positive results were obtained by the injection into cats of stools free from amœbæ. We are convinced that Celli and Fiocca were not always working with amœba dysenteriæ. Moreover, on page 212 of their work we find that in the one case in which living amœbæ took part there was "un po piu sanguinolenta," as in the other three cases in which the amœbæ were killed. It is just this quality, as Flügge has remarked, which often characterizes this dysentery. The other varieties of amœbæ Celli and Fiocca have bred from intestinal contents, the authors themselves confess, are entirely different from amœbæ coli. This only the more suggests that probably some of these amœbæ experimented with were harmless amœbæ and not amœbæ dysenteriæ.

In our studies on dysentery in Manila we have been entirely convinced that we meet with at least two varieties of amœbæ in the stools of human beings. One of these varieties (amœba dysenteriæ) we have found in 68 of our 79 cases of amœbic dysentery, and in the neighborhood of 300 clinical cases of dysentery.

In another class of cases (cases without dysentery) in which we have purposely set out to find amœbæ after the administration of Rochelle salts we have found amœbæ in a small number of the cases (in about 4 per cent of those examined). The amœbæ found in these cases, with no dysentery and no history of it, are somewhat smaller generally than those found in our dysentery cases and have never been seen to contain red blood corpuscles. We are not willing to say that there are any other definite constant differences between these amœbæ and the amœba dysenteriæ except with regard to their action on cats.

One of these cases which has been under our observation for several months has had these harmless amœbæ in his stools constantly during this time, yet he has no dysentery and no history of any, and he has no intestinal trouble. We have repeatedly injected large numbers of these nondysenteric amœbæ (amœbæ coli), while motile in the stools, into the rectum of cats, but with no effect. We have neither been able to produce dysentery with them nor any lesions of the large bowel. Our experiments with straw amœbæ, which we have bred, has been similar: in not one of these cases has any dysentery or ulceration of the large intestine been produced.

On the other hand, we have had no difficulty in producing dysentery and ulceration of the large bowel in cats by injection of the stools or contents of liver abscesses containing motile amœbæ dysenteriæ. In 2 cases in which the liver abscesses have been found sterile by cultural experiment, but which contained many motile amœbæ, dysentery and characteristic ulceration of the bowel was produced in the two cats used. In the stools of these cats and in the ulcers in their colons we have found very large numbers of motile amœbæ, often containing red blood cells. The ulcers in the bowel are most striking in their resemblance to the amœbic lesions of the large intestine in man. The mucosa and submucosa have been particularly affected. We have been able to produce early amœbic ulcers in three days after inoculation; in five days the ulcerations may be well advanced. The complete description of this work will be referred to in a later paper. In a large number of experiments we have not been able to produce ulcerations or dysentery by the injection into the rectum of cats of bloody mucous stools from our acute specific dysenteric cases.

Why is it, then, that there still exists so much controversy about the amœba dysenteriæ? Kartulis, Councilman and Lafleur, Kovacs, Kruse and Pasouale, as well as ourselves, have all shown that it is an exquisite tissue parasite. We are convinced that anyone who has sufficient and proper material at hand can easily convince himself of the pathogenic action of this parasite, amœba dysenteriæ, by inoculation of cats if he cares to take this trouble.

When we review the literature of amœbic dysentery we frequently find a number of dysentery cases reported in which amœbæ are found only in a very small number. Let us suppose that the case which we have spoken of, and which we have had under observation for the past few months, whose stools contain the amœba coli, with no symptom of dysentery, became infected with bacillus dysenteriæ. Then, if a group of cases occurred with infection with this bacillus, it might be reported that amœbæ were found in only 1 case, and hence amœbæ in general have nothing to do with dysentery, etc. We cite this case because we believe that instances of this kind have occurred. In certain countries under certain conditions harmless amœbæ might be found quite frequently in the stools. So when we read that an observer reports 25 cases of dysentery with 5 cases in which amœbæ were present we wish to inquire, first, what lesions were present in the large bowel in these 5 cases; and

second, were these amœbæ found capable of producing dysentery and dysenteric lesions in cats?

It is very clear from the literature that all observers have not worked with the same amœba. We must also remember that there may be many reasons for not finding amœbæ in dysentery: First, in certain forms of dysentery amœbæ do not occur. Second, one examination will not suffice, nor will sometimes several. Occasionally one may not find them at all in the stools during life, and yet at necropsy they may be very numerous in the lesions. We recall 1 case in which we looked carefully for four days in succession at the stools, but were never able to find amœbæ. Bacillus dysenteriæ was also carefully sought for, but not found; neither was there any agglutination of the blood serum for bacillus dysenteriæ. The man died, and at necropsy motile amœbæ dysenteriæ were found in large numbers in the characteristic lesions of the large bowel. We must remember that in infections with the anchylostoma no eggs may be passed for several days when extensive infection may exist. The same may be true often with other intestinal parasites. Again, the stools must be fresh and not mixed with quinine or disinfecting solutions or urine, which substances naturally quickly kill amœbæ. The stools must not be too cold. Lastly, it is to be remembered that after ulceration has been established, and particularly in the healing stage, the amœba may disappear from the stools. In this stage from the already existing ulcers, however, there may still be a dysentery for a variable time, no doubt effected by the bacteria present in the intestine. We will also recall that all cases of amœbic dysentery do not die, but that a number recover, and that we often find healing ulcers at necropsy. So if amœbæ are not found near the close of a dysentery we can not always conclude that they were not present in the active stage of the disease.

In closing our remarks on our amœbic cases for the present we wish to say a word in regard to dysenteric liver abscess. As Manson states (Tropical Diseases, 1898), there can be no question as to the existence of an intimate relationship between dysentery and liver abscess. Kartulis states that of some 500 liver abscesses which had come under his observation 55 to 60 per cent were of dysenteric origin, but he does not state the proportion of cases of dysentery in which abscess supervenes. (Lafleur, in Allbutt's System of Medicine, Vol. IV, 1897.) In 3,680 dysentery autopsies made in various tropical countries and collated by Woodward, 779 (21 per cent) revealed abscesses of the liver. Kruse and Pasquale found abscess six times in 57 cases of amœbic dysentery; Councilman and Lafleur six times in 15 cases. We have found liver abscesses fourteen times in 97 cases of amœbic dysentery. It has been shown over and over again that in a large proportion of liver abscesses the usual pyogenic cocci are absent. Bacteria were absent (by cultural experiment) in 7 of our 14 liver abscesses. In 2 small abscesses they were absent. It is very suggestive, as Manson has said, that in just this form of abscess in which these organisms are absent we find amœbæ dysenteriæ. Moreover, we are to remember that a liver abscess is not a proper abscess; amœbic liver abscess pus is not like pus elsewhere. As an abscess it is altogether peculiar. The argument that bacteria are not found in large liver abscesses, it is true, may be met with the statement that they might have been present and died out, as sometimes happens in old pyosalpinx cases. This view receives some support from the fact that in some instances the pyogenic bacteria and sometimes colon bacilli are present. But we must remember, on the other hand, that this form of liver abscess is not an ordinary form of abscess, as has been pointed out above; also, as far as we know, no one has pointed out that bacteria are any more frequent in small (early) liver abscesses, but, rather to the contrary, that they are more often absent. It is to be remembered that also in those cases of liver abscesses which are typical of the form of which we have been speaking, but in which amœbæ have not been demonstrated, that amœbæ are often very hard to find in these abscesses. Occasionally, as has often been reported, they may be looked for several days before they are found. This may often be explained by the fact that they are not present in so great numbers in the body of the abscess cavity, but are found in greater numbers in the abscess wall in connection with the breaking down tissues. We ourselves have, on several occasions, when perfectly fresh pus has been sent to us from an operation on liver abscess, been unable to find amœbæ in it in a very prolonged search. When in pus from the same cases later we have found them in great numbers. So, unless the examinations have been repeated and very thorough, the statement that these abscesses contain no amœbæ is of little value. We fear that the statistics are made up from many such hasty examinations. It might also perhaps be argued that if bacteria had disappeared in these abscesses so might the amœbæ disappear, though the argument may not have so much force when used in this way. In conclusion, we must remember that the bacteria may be only secondary invaders in liver abscesses and that we find amœbæ often present when bacteria are not; that

we often find amœbæ present at the same time with bacteria, and that the number of these cases (where the search for amœbæ has been thorough) in which the amœba has not been found are comparatively small.

We have referred above, in describing the acute form of our dysentery, to the ingestion of the bacillus dysenteriæ in one individual. An Indian criminal under sentence of death, shortly before his execution, with his own consent and for a remuneration, took, about 7 p. m., 15 grains of sodium bicarbonate and fifteen minutes later a forty-eight hour bouillon culture of bacillus dysenteriæ in warm milk. He had had absolutely no dysentery, and his stools examined previously were well formed, dark, and contained no blood or mucus. On the next morning a well-formed normal stool was passed. During the evening of the next day his bowels moved again. The stool was moderately large and soft. Fine flakes and streaks of grayish mucus could be seen in it. Microscopical examinations of particles of this mucus showed a very large number of bacteria. In some fields almost nothing but bacteria could be seen. Many of these were not motile. Others, not so numerous, were very motile, and still others slightly motile and of similar morphology to bacillus dysenteriæ or to bacillus coli communis. There were a number of epithelial cells and a few red blood cells. The next stool was passed nearly four hours later. It consisted practically of large masses of bloody streaked mucus, and in amount equalled a large stool. Microscopical examination showed numerous epithelial cells, leucocytes, red blood corpuscles, and a large number of bacteria. Very few food particles were present. The stool was made up practically of masses of mucus, cells, and bacteria No amœbæ were present. During the night the patient had seven stools. They gradually became more blood streaked, and by the next day consisted of practically nothing but masses of reddish bloody mucus. During the day the patient had 12 stools, and the next night and morning 19 stools. The temperature had reached 102° F., and there was tenderness over the abdomen. We have no further notes on this case, but the patient recovered from his dysentery before execution. The onset here was not as abrupt as it often is in this form of dysentery. Natives are more or less immune to acute dysentery. The bacillus dysenteriæ was recovered from the stools and grew characteristically on all media after its recovery. More colonies of bacillus dysenteriæ developed on the agar plates than are often seen, yet the number of these colonies did not begin to equal the number of colon colonies which developed on the plates. We repeat again that we have never found the organisms in pure cultures in the stools. It has always been associated with bacillus coli communis and often with species of streptococci and sometimes staphylococci and other inconstant organisms. In fact, for a long time we were in doubt about the bacillus dysenteriæ, because we often found it in such small numbers in the stools and sometimes with great difficulty. Yet it is not more difficult to isolate from the fæces than bacillus typhosis when one looks at the right time. We have not referred to the virulent variety of bacillus coli described by Celli. It was not generally present in our acute cases. Occasionally the colon bacillus found in the stools of our cases showed no virulence toward animals; more rarely they were pathogenic for them. We, however, are inclined to think that certain varieties of colon bacilli may play an important part in certain forms of dysentery. The positive serum reactions which we have obtained at times for colon bacilli are suggestive. Nevertheless, we do not wish to lay too much stress on these reactions at present. Their interpretation now is in a somewhat uncertain light. We are about to undertake in the near future a more thorough study of these bacilli.

The experiments with bacillus dysenteriæ have shown us that when animals are immunized against large doses of this bacillus their blood shows certain antitoxic bodies, as evidenced by the fact that their blood serum in high dilutions causes agglutination of cultures of this organism, and by the fact that when their serum is injected at the same time with bouillon cultures of bacillus dysenteriæ into other animals no effect, or only a slight one, is produced by this organism. In this way we have been able, with monkey's blood serum, to render intraperitoneal injections of bacillus dysenteriæ into rats harmless. Reasoning in this way and from the blood serum reactions in our clinical cases in man, we have hoped that a serum therapy could be established for the disease, particularly as all other treatment is often of little avail. A cubic centimeter of the bouillon culture of bacillus dysenteriæ injected subcutaneously into a Manila pony causes a rise of temperature to 105° F. or more, with a gradual fall in a few days. During this time the animal may seem quite sick. If in the process of immunization an overdose is given the animal may become apparently quite ill and his temperature may rise to 108.5° F., as has happened on two occasions with our horse. The horse's blood now shows agglutination of bacillus dysenteriæ in high dilutions. We hope to be able to soon report on the treatment of the disease with this serum. We could never obtain monkey's serum of nearly so great an antitoxic strength as we have already procured from the horse.

Professor Flexner and Professor Barker, in their preliminary report upon an expedition sent by the Johns Hopkins University to investigate the prevalent diseases in the Philippines (Johns Hopkins Hospital Bulletin, February, 1900), state in regard to their bacteriological studies in dysentery: "The intestinal flora was studied in its entirety by means of plate cultures. Varieties of micro-organisms were separated. Many were well-known species. Tests with blood sera for agglutination were made. In this way two groups of bacilli were thus differentiated, (1) having affinities with the group of bacillus coli communis, (2) having affinities with the group of bacilli of which the bacillus typhosis is the type. A bacillus belonging to the second group which is still under study would seem to agree with the bacillus dysenteriæ isolated by Shiga from cases of endemic dysentery occurring in Japan. It is regarded by us as an important factor in the causation of the dysentery of the Philippine Islands." We have eagerly awaited Dr. Flexner's complete report on this subject, which we regret has not as yet reached us.

CONCLUSIONS.

Two distinct forms of dysentery exist in and about Manila, (1) an acute specific infectious dysentery, (2) an amœbic dysentery.[1]

The first is probably caused by the bacillus dysenteriæ, and the disease can not be produced experimentally in animals. The second is caused by the amœba dysenteriæ, and the disease can be produced experimentally in cats.

These two types of dysentery may be separated easily clinically. The one by a blood serum reaction, and the other by the presence of amœbæ dysenteriæ in the stools.

There are also at least two forms of amœbæ found in the human stools. The one form, amœba dysenteriæ, is capable of producing dysentery and dysenteric lesions in man and cats. The other, amœba coli, is apparently not harmful to either of these.

In conclusion, we wish to thank Dr. Simon Flexner, professor of pathology in the University of Pennsylvania, for several valuable suggestions to one of us during the first part of this work, and to Dr. W. R. Hall, major and surgeon, United States Army, commanding the First Reserve hospital, for the use of his valuable medical library. Also, we wish to thank Dr. G. I. Cullen, acting assistant surgeon, United States Army, for photographs.

RHEUMATIC AFFECTIONS.

Under the heading of rheumatic affections are tabulated the statistics of rheumatic fever, rheumatism, and myalgia and chronic rheumatic arthritis. In 1898 the rate of admission for the Army, regulars and volunteers, was 66.24, and in 1899 68.83 per thousand of strength. The rates in the Philippines, Cuba, Porto Rico, and the United States did not differ much from each other. The rate of discharge for disability on account of these rheumatic affections was 1.15 in 1898 and 1.52 in 1899, as compared with the average annual rate of 1.35 for the Regular Army during the decade 1888–1897.

PULMONARY CONSUMPTION.

In 1898 there were reported 547 cases of pulmonary tuberculosis; 165 were terminated by discharge for disability and 38 by death, equaling the respective rates of 3.70, 1.12, and 0.26 per thousand of strength. In 1899 the cases numbered 420, with 190 discharges and 57 deaths, equaling the respective rates of 3.98, 1.80, and 0.54 per thousand men. The Philippine Islands gave the highest rates in 1898: Admission, 5.95; discharge, 2.12; death, 0.50. In 1899 the admission rate for Porto Rico was 5.10, for Cuba 4.49, and for the Philippines 4.48; the highest death rates occurred in Porto Rico and the Philippines, 0.80 and 0.79 per thousand men.

[1] We have not referred in this article to the mild form of catarrhal dysentery which occurs, but is rarely fatal here.—R. P. S.

It was speedily discovered by our medical officers in the Philippines that consumptive cases progressed unfavorably in that climate, even when cared for in the convalescent hospital on Corregidor Island in Manila Bay. It has therefore became the practice to transfer such cases to the United States for treatment in the general hospital for consumptives at Fort Bayard, N. Mex. Many consumptives from Manila have passed under the observation of Maj. A. C. Girard, surgeon, United States Army, in command of the general hospital, Presidio of San Francisco, Cal., who is of the opinion that—

> Tubercular cases should be transferred (from the Philippines) at the earliest possible stage, even before the bacillus can be demonstrated. An occasional error of diagnosis would be amply compensated by the possibility of recovery from consumption by an early transfer to Fort Bayard.

During the past two years the greater tendency of the colored troops to become affected with pulmonary consumption is shown by a comparison of the rates of admission. In 1898, white troops, 3.65; colored, 4.59 per thousand of strength. In 1899, white, 3.96; colored, 4.20.

DISEASES OF THE RESPIRATORY ORGANS.

These diseases, which in 1897 gave an admission rate of 77.74 and a death rate of 1.64, and during the decade 1887–1896 caused an average annual rate of 109.10 admissions and 0.83 death per thousand of strength, occasioned somewhat larger rates during the more active service of the years 1898 and 1899. In the former year the admission rate was 137.35, and in the latter 125.33. Troops in the United States had the largest rate in both years—152.13 in 1898 and 202.34 in 1899. The admission rate for these diseases in all the islands was less than the rate for the Army as a whole.

Pneumonia added but little to the admission rate of these diseases, but was the chief factor in the causation of mortality. In 1898 there were 1,020 cases with 136 deaths, and in 1899 629 cases with 99 deaths, giving a total of 1,649 cases with 235 deaths in the two years, the fatal cases constituting 14.25 per cent of the total, or 1 death in 7 cases. The rate of admission for the Army in 1898 was 6.90 per 1,000 of strength, and the death rate 0.92 per 1,000. In 1899 these rates were 5.96 and 0.94, respectively. Troops in the United States had the largest and those in Porto Rico the smallest admission and death rates from this disease.

The mean annual admission rate during the civil war was 32.45 and the death rate 7.79 per thousand men. Twenty-six per cent of the cases were fatal, the disease occasioning 1 death in 3.85 cases. As a contrast to this, the mean annual rates of the decade, 1888–1897, were: Admission, 4.06; death, 0.63.

ANKYLOSTOMIASIS.

While stationed at Ponce, P. R., Lieut. B. K. Ashford, assistant surgeon, United States Army, made a special study of the anæmia so common among the underfed natives of that island. In a number of cases he found the diseased condition to be due to the presence of the *Ankylostomum duodenale* in the intestine. His report, which is submitted below, was made the basis of a circular issued by the superior board of health of the island, inviting the attention of medical practitioners to the methods of recognizing and destroying the parasite.

I have the honor to report upon 20 cases of the severe anæmia commonly seen among the poor of this island. One of the first observations made by professional men here is the prevalence of anæmia, especially among the poor. This is at first attributed usually to starvation or poor food, then to malaria, and then to the "climate." Through the kindness of the physicians of Ponce, I am able to state something as to the mode of treatment adopted up to this time. Some have observed that the ignorant peon treated himself by purging, with beneficial effects for a time, and a relapse to previous conditions soon afterwards. Iron and arsenic have been prescribed largely, but with little benefit. Some physicians have frankly declared it beyond their power to cope with the disease, which they regarded as a pernicious progressive anæmia of obscure origin. The stools had been examined, but no worms being evident, this as a cause was dismissed. I was lead to examine the fæces for the ova of "ankylostomum duodenale," and found them in great numbers. Soon after a large dose of thymol brought away the parasites, male and female. No sooner had I stated my results to the physicians of this city than they agreed with the diagnosis, and verified the parasite and its eggs. Their testimony is as follows:

1. This disease is the most destructive and general disease of Porto Rico.
2. It is found typically and very frequently among the poor and badly fed.
3. Most cases are similar.
4. That bad food and bad hygiene are responsible for much of its power for evil.
5. That blood foods have never exercised more than a temporary influence on the course of this disease.
6. That improvement follows purgation.
7. That up to this time the existence of this parasite had not been proven on this island; or, if proven, not within their knowledge.

In studying this disease I have taken 20 cases which I considered typical of "Porto Rican anæmia," or "tropical chlorosis." These cases were selected from the provisional field hospital for indigent and sick Porto Ricans established after the flood of August 10, 1899, in this city. Although the histories of these cases are inclosed I should like to refer to such points as seem to me interesting and of frequent occurrence in this disease.

1. The family history.—Most patients give a history of deaths in the family from a like disease. At times this history is truly appalling, and casts a light on the extent of the infection among the people. Many claim the deaths to have been due to "malaria" or "diarrhœa" or "obscure fever." Of course this matter is problematical, but it is fair to suppose, inasmuch as the disease is marked often by irregular fever, with intermissions, that their diagnoses may be questioned, and to recollect that our own physicians have in the past placed on malaria responsibilities which do not belong to it. But questions as to chills are extremely unsatisfactory. I know there is much malaria here in the lowlands; I have followed such cases through their course; but the testimony of local physicians coincides with mine, that malarial organisms in the blood are not so often seen as would be supposed. Chills, then, are not so frequent; there are few "ague cakes;" the pallor is not that of malaria, and the scleræ are not icteric. The most suggestive fact outside of blood examination is that the cases come from the mountains and the valleys; some of the very worst cases I have seen came from highly salubrious mountain districts. Nevertheless, I hesitate to affirm that many cases of malarial cachexias do not exist to swell the sum of anæmics here.

2. The previous history of the patient.—The diet is a powerful factor in turning the scale against the unhappy victim of ankylostomiasis. Rightly the physicians here quote its influence. Personally, I have eaten and slept in all parts of this island—not alone on the frequented roads, but in those rarely visited by strangers, and can submit my testimony to that quoted in support of this influence. The relation of the daily life among the working classes has been confirmed in talking with many owners of sugar and coffee plantations and their employees. They rise at from 4 to 6 a. m. Some take a little black coffee; some, boiled water and sugar; some, nothing. They work till 11, when they breakfast on about 4 ounces of codfish and a few pieces of plantain. They return to work at 1 and continue till 5 p. m. Dinner is composed of rice and beans; some have only boiled rice with lard, and some boiled rice alone. It may be mentioned that they get plenty of bad rum and some bad wine. This seems a slight enough diet, but the hurricane deprived them of even this, and the sick poor came drifting down on Ponce. I believe it not probable that those degraded to the level of people whose life is bounded by a tropical plantation, enjoying little beyond the cutting of cane and picking of coffee, can have a high standard of personal cleanliness, and, as a fact, bathing is not often practiced. Fæces are distributed over the earth wherever the individual happens to be while at work, or in a little shack when at home, but directly on the ground always. Indeed, fæces pollute their very houses. Ponce is a town of perhaps 40,000, yet it has no sewerage, and is in the lowlands near the sea. Closets and kitchens are in conjunction in many houses. The

water soon takes up its quota of whatever is noxious. Those who are clean in their habits (and the educated classes are a most cleanly people) are polluted by the filth of the poor and ignorant. The configuration of this island is one of steep mountains and deep ravines, with broad plains near the sea. Heavy rains wash the larvæ from each fæcal deposit into the water courses, and this muddy water is probably one source of contamination; contaminated earth on the hands of laborers is another; fouled garden is another. The larvæ have not yet been demonstrated in the water or mud. The drinking water of nearly all well-to-do people is filtered, and in this class we do not find so great a preponderance of this disease.

3. The subjective symptoms.—It is difficult to obtain a history of the disease from its inception, for many have it from infancy. Generally it is possible to obtain some such history as this: A variable appetite, some nausea and vomiting, pain in epigastrium, either constipation or diarrhea (or these may alternate), sometimes dysentery, swellings of the feet and ankles, no loss of weight, sleeplessness, restlessness, tinnitus aurium, giddiness, faintness, severe headache, palpitation of the heart, progressive debility; little perspiration, but kidneys active; fever sometimes, but no chills. I have not been able to get a history of geophagism nor of intestinal hemorrhage described by some authors. Sometimes the patients improve for a time after medication, but not permanently.

4. Objective symptoms.—Pallor: This is divided into three classes by a prominent physician, but I can not see that it has reference to more than the individual color of the patient, whatever that may be, irrespective of the disease. The conjunctivæ, lips, tongue, gums, nails, and cheeks are in some cases perfectly pallid, the mucous membranes especially being of a deathly white. The skin is generally a pasty yellow, a dirty brownish gray, or a grayish white. Expression: A passive expression is often seen, and its peculiar character is heightened by puffiness of the eyes and bloating of the face. Œdema: This is simply the usual accompaniment of severe anæmia. Practically every variety is seen, the chief being, in order of importance, œdema of the feet and ankles, œdema of the face, ascites and œdema of the scrotum. Hypostatic congestion of the lungs exists often. The important point is that with this disease there may be emaciation. This has not been present often in my cases; on the contrary, the patients are apparently well nourished. Anæmic ulcers are sometimes seen on the legs and an incorrect accusation of syphilis may be made. Corneal ulcers are at times seen. One of my cases presented corneal ulcers of both eyes. Respiratory symptoms: Generally none from this disease save in increased rapidity of breathing from anæmia, serous accumulations, or hypostatic congestions. Liver: No constant symptom. Spleen: No constant symptom. Heart: These symptoms are very aggravated; signs of a pernicious secondary anæmia. Pulsating vessels: Both jugulars, superficial veins of the arm, and vessels about the root of the neck and heart, in severe cases with greatly dilated heart; pulsating suprasternal and supraclavicular regions and diffused pulsations in the anterior thoracic wall. All kinds of deductions might be made by a careless observer. Hæmic murmurs are almost constantly present and are in many cases heard in the veins of the neck. The urine: No albumen is found, and the specific gravity is constantly low. The pulse is weak, rapid, soft, and compressible. The blood: Attention is invited to the accompanying summary of blood examinations. The following deductions are drawn:

1. A severe anæmia, falling as low as that of Addison's anæmia in count of red cells in some cases.
2. A very low hæmoglobin average, and a very low color index.
3. A marked eosinophilia in some cases. Forty per cent reached in one case. This follows the observation of Neusser.
4. No leucocytosis common to the disease itself. Leucocytosis recorded is always apparently due to complications, as noted.
5. Frequent presence of normoblasts and in some cases megaloblasts, but never a majority of megaloblasts.
6. Poikilocytosis common. Manson denies this.
7. Utter unreliability of blood foods without removal of the cause, the ankylostomum. This blood examination was the first line of research taken up, and as soon as anæmia was proven the patient was given blood tonics with temporary supporting treatment suited to the individual case, with the idea that the patient might be carried along until the true cause could be discovered. Of course now all treatment has been substituted by anthelmintics, chiefly male fern and thymol, and the blood and heart tonics will be again tried when the eggs have disappeared from the fæces. I was led to examine the stools carefully from the high eosinophile count, and it is certainly evident that trichinosis has a rival for high counts in ankylostomiasis.

The ankylostome was found in all cases save one, a case of tuberculosis pure and simple. This patient was chosen to represent a contrast, and I think he does.

There is true leucocytosis, and the eosinophiles are not much in evidence. Moreover, the red-cell count is much higher than all the others, as is the hæmoglobin record. In calling attention to this infection we enter upon a large field. The histories of this disease have been made up to show what percentage of the people have the disease in certain countries: 25 per cent in Egypt; 20 per cent in Maitland; 52 per cent in Madras; 13 per cent in Kyoto, Japan; but no percentage can be cited as yet for this island. Dr. B. Scheube, of Greiz, speaks in his work of its existing in the Antilles, but no island is specified, nor is the extent of the disease stated. From my own observation, and from the opinions of the resident physicians of the island, I believe it to be widespread and destructive. Only 20 cases have been examined, yet all save one have given me the ova of this parasite in large numbers. As the 20 cases were chosen at random from hundreds more just like them clinically, and as the one exception noted was chosen only for contrast, I am convinced that further investigation will show that the disease has killed its hundreds, and that it is curable and preventable. The proof of its prevalence lies naturally in the hands of all scientific physicians of this island. I can not further judge than from a short experience and the proof positive evidence of 19 cases submitted. If this infection is as great as it is possible and probable that it is, we may turn to the practical question of importance:

There is in Porto Rico a dense population in a small country. In a space of about 100 miles by 60 we have probably over a million people. Of the working class it can not be denied that a large percentage have anæmia, and should the future verify my suspicion means are at hand to increase not only the well-being of those now suffering, but to insure to the owner of large haciendas of coffee and sugar a better class of labor; to insure to the army protection from the invaliding from anæmia of such troops as are enlisted here; to insure to our American troops protection against the disease; to relieve the State and the hospitals here from the expense of caring for a large number of anæmics who are now slowly dragging on to a fatal end. Perhaps our own sick reports will unfold some additional facts. I mention here only such possibilities as have occurred to my mind, but it is a significant fact that though it is present in Germany Scheube notes that it is confined to a few cases. In other words, it appears to assume only such proportions as a country will allow it to assume. I repeat, I have no certain knowledge of the proportions it has assumed here. I have been able only to call attention to what I consider to be its extensive prevalence, and I can not quote any full experience from treatment. I have given thymol in several cases, with the always easily demonstrated presence of the parasite. From the exceeding kindness and the scientific spirit shown by the local doctors, I can not doubt that it will be but a short time before measures will be taken, if there is sufficient extent of the disease found, to alleviate the conditions.

I therefore respectfully submit this report, a photograph of my cases, their detailed histories, specimens of the eggs and parasites in 4 per cent formalin solution, and various preparations of stained and unstained blood.[1] I will not lengthen this paper by any description of a parasite so well known and so fully described by the professor of helminthology at the Army Medical School, nor will I make further remark on the history of the disease, its evident prophylaxis, and simple cure, until I can call to my aid a more extensive familiarity with it.

BERI-BERI.

Beri-beri prevailed extensively among Filipino prisoners of war at Cavite, where, in July, 1899, they were said to have been decimated by the disease, but no report concerning its prevalence there has been received. The first case reported as having occurred among our troops was in the person of a private of Company M, Fourteenth Infantry, a young man 22 years of age and a native of Akron, Ohio. His illness began suddenly, about July 21, 1899, while stationed at the arsenal at Imus. He was admitted to the hospital at Bacoor, August 6, where on August 17 Brigade Surg. George H. Penrose reported concerning him:

Present illness began rather suddenly, about July 21, 1899, after an attack of acute diarrhea, with pains and weakness in muscles of thighs and legs, preventing him from walking. Character of pain, dull aching; has had paræsthesia, "falling asleep"

[1] These were sent to the Army Medical Museum.

of legs. Has had occasional attacks of cardiac palpitations. These symptoms have become gradually more marked, and similar conditions are beginning in arms and forearms. Physical examination: Weight, 125 (former weight, 174) pounds; height, 70½ inches; apparently much emaciated; skin and mucous membranes pale; tongue pale, flabby, lightly coated; pupils react equally to light and distance; pulse of low tension, regular. Heart: Slight localized apex beat perceptible; first sound much ruffled, almost inaudible, second sound at base accentuated. Slight throbbing of carotids, pulsating jugulars. No murmurs audible. Area of cardiac dullness not increased. Muscular system of thighs and legs decidedly atrophied. Knee jerk practically abolished, muscles of thighs and calves tender on deep pressure. Sensation remains normal in legs. Gait weak and shuffling, not ataxic. Stands and walks with eyes closed. Electrical reactions not obtained. Steps have been taken to have the building wherein this soldier was quartered disinfected and whitewashed.

The only other information concerning this man found in the records is a note of his death October 4, 1899, in the Second Reserve hospital, at Manila: "Died at 8.15 a. m. of multiple peripheral neuritis, general, (beri-beri ?)."

A second case was reported by Acting Asst. Surg. J. M. Ward, from Carranglan, Luzon, August 1, 1900. The patient, a private of the Twenty-fourth Infantry, was admitted, with excessive pain in the head, back, and lower limbs, following a chill; temperature 38.6° C. Next morning the headache continued with stiffness and pain in the legs. The reflexes were abolished and the loss of power in the extensors of the right leg was so marked as to make locomotion impracticable; the right thigh measured 20 inches in circumference. Until June 25 his condition remained unchanged but for a decrease in pain and stiffness and a rapid atrophy of the right thigh. By June 30 an improvement was manifest. He was confined to bed, but his appetite returned and he slept well. During the next two weeks there was much improvement in his condition. The pain ceased and the patient became able to stand without a crutch, but the right thigh measured only 15.75 inches. Ten days later, July 25, he was able to walk to the company quarters, and on the 27th he was transferred to quarters. The treatment on admission was antimalarial with morphia hypodermatically; but this was speedily changed to potassium iodide, three times daily, with strychnia by hypodermatic injection, massage, and special diet.

VENEREAL DISEASES.

The admission rate for the Army, regulars and volunteers, in 1899 was 133, with 2.61 discharges for disability per thousand of strength. This admission rate is considerably larger than those of former years. The rate of the Army, regulars and volunteers, was 82.04 in 1898, with 1.05 discharges per thousand men. The regulars in 1897 had a rate of 84.59, and their mean annual rate for the decade 1887–1896 was 76.92.

The admission rate of the regulars in 1898 was 79.92, of the volunteers 83.01, per thousand men.

The following tabulations show prevalence by comparative rates of admission in 1899:

1899—REGULARS AND VOLUNTEERS.

	Army.	Cuba.	Porto Rico.	Philippines.	United States.
Syphilis and results	13.98	16.56	30.59	11.74	13.49
Gonorrhea and results	80.23	87.92	170.64	60.39	87.29
Chancroids and results	38.79	44.39	85.06	44.65	26.57
Total venereal	133.00	148.87	286.29	116.78	127.35

1899—REGULARS.

	Army.	Cuba.	Porto Rico.	Philippines.	United States.
Syphilis and results	14.77	15.87	28.38	13.26	13.85
Gonorrhea and results	93.18	106.53	174.48	66.92	99.66
Chancroids and results	38.29	48.88	92.32	40.18	24.92
Total venereal	146.24	171.28	295.18	120.36	138.43

1899—VOLUNTEERS.

Syphilis and results	12.75	17.57	50.00	9.60	12.89
Gonorrhea and results	59.93	60.38	136.84	51.23	67.01
Chancroids and results	39.56	37.74	21.05	50.93	29.28
Total venereal	112.24	115.69	207.89	111.76	109.18

The greater prevalence of these infections among the colored troops is seen from the following rates of admission to sick report:

	White troops.		Colored troops.	
	1898.	1899.	1898.	1899.
Syphilis and results	9.39	13.39	28.24	22.43
Gonorrhea and results	51.18	78.16	67.29	109.82
Chancroids and results	17.91	37.04	54.05	63.67
Total venereal	78.48	128.59	149.58	195.92

Compared with the rates of previous years, this prevalence of venereal disease among our troops is excessive, and in Cuba and Porto Rico gave much anxiety to our medical officers. Our rates, however, high as they are, compare favorably with those of the British army at home and abroad. The admission rate at the home stations in 1898 was 132.7; at Dublin, 277.7, and at Portsmouth, 258.8. On foreign service the rates were higher than any of these—in the West Indies, 290.3; in the Straits Settlements, 348; among the large command in India, 371.4, and in China, 613.8. It is to be noted that the rate 371.4 in India is less by 136.4 per thousand than in 1897.

The increasing prevalence of venereal diseases among the troops in Matanzas and Santa Clara, Cuba, led Maj. F. J. Ives, surgeon, United States Volunteers, chief surgeon of the department, to institute measures for their repression. His system consisted in subjecting all enlisted men to a weekly examination, treating those who showed signs of disease and depriving them while under treatment of canteen privileges and passes from garrison. Thus all cases were submitted early to treatment, and were prevented from being aggravated by fresh exposures or by the use of stimulants. This system, which was at first opposed by army officers, is said to have given such excellent results that it now meets with nothing but commendation at the posts where it is in operation. Major Ives has not reported on this, and as he is now in China it is probable that he will not have an early opportunity of doing so.

The following circular was issued by the department commander:

CIRCULAR } HEADQUARTERS DEPARTMENT OF MATANZAS AND SANTA CLARA,
No. 4. } *Matanzas, Cuba, March 13, 1900.*

The following extracts from reports made by the chief surgeon of the department are approved and published for the information and guidance of the commands serving within the department:

* * * * * * *

"There should be a weekly examination of all the enlisted men in the command made by the medical officers, and the company commanders should be required to

be in attendance. The men should be stripped and this examination should be complete as far as relates to any outward evidences of venereal disease or other infections. A list of all the men found infected with venereal troubles should be made out under the direction of the company commander and posted conspicuously on the bulletin board or in the barracks of each company organization. Among these thus affected only those who are actually incapacitated from performing their duties should be placed on sick report, the others being required to perform all duties. The privileges of the canteen and all pass privileges should be withdrawn from all whose names are thus posted and extra severe punishment meted out to those who are detected violating this rule. As soon as anyone thus listed is, in the opinion of the surgeon, free from all manifestations of venereal infection the surgeon should notify the company commander, so as to enable the latter to take his name from the list.

"This course can not be construed into actual punishment of the enlisted men, for the reason that in taking away his canteen and pass privileges it is merely in the nature of removing the causes which tend to retard his recovery.

"A weekly inspection is necessary, as there is no other way by which it can be determined whether or not the individuals are infected.

* * * * * * *

"In connection with my letter of March 8, 1900, relating to the amelioration of venereal infection among the troops in this command, I have the honor to further recommend that at each post a medical officer be required to give a brief course of instruction to the noncommissioned officers on subjects pertaining to this matter. This course should include an outlined history of such venereal diseases as syphilis, gonorrhea, and chancroids, with their effects and results; the most practicable methods of prevention, such as avoidance of these women when the chance of contagion is most apt to occur, proper cleanliness and disinfection, etc.; also any other points which will give a practical and comprehensive idea as to their origin, course, and sequelæ, and the proper methods to avoid and prevent contagion.

"The intention of these instructions is to impart a common-sense knowledge among the most intelligent of the enlisted men, so that they will be in a position to influence and instruct the men in their companies."

* * * * * * *

The stated inspection will be made every alternate Friday, except when the increase of contagious diseases is shown, when they will be made every Friday.

Post commanders will submit to these headquarters a report in detail, showing the result of each inspection.

By command of Brigadier-General Wilson:

S. H. Lincoln,
Lieutenant-Colonel Tenth Infantry, Acting Adjutant-General.

ALCOHOLISM.

The admission rate for alcoholism in the Army, regulars and volunteers, was 14.49 per thousand of strength in 1899 and 8.65 in 1898, as compared with 27.86 in the Regular Army in 1897 and 36.90, the mean annual rate of the preceding decade. From this it will be seen that there is more drunkenness in a command doing garrison duty in time of peace than among troops in active service. But, notwithstanding the small admission rates recorded above, alcoholism and its direct results were responsible for 29 deaths and 7 discharges for disability in 1899, and for 24 deaths and 9 discharges in 1898. During the past year the rate in Porto Rico and Cuba, where the troops were on garrison duty, was, respectively, 49.37 and 26.33, while in the Philippines, where active service was in progress, the rate was only 6.29. Newspaper articles have given prominence to the disastrous effects of "vino" and other alcoholic drinks among our troops in the Philippines, but their statements are by no means sustained by the official reports. In 1898, when for five months the troops were stationed in garrison in Manila, a rate of 21.70 was given by the small number of regulars present, but the rate of only 4.71, given by the larger number of volunteers in service there, reduced the rates for the Army, regulars and

volunteers, in the Philippines to 9.69. As stated in my last report, these rates do not represent the amount of intemperance in the Army or in any of its parts, but as they are all derived from similar data, to wit, the number of cases in which medical assistance was invoked to avert danger to life, they are useful for purposes of comparison.

INSANITY.

Cases and rates of admission for the Army, regulars and volunteers, during the calendar years 1898 and 1899.

	1898.		1899.	
	Cases.	Rates.	Cases.	Rates.
In Cuba	6	0.72	32	1.60
In Porto Rico	5	.88	14	3.76
In the Pacific islands	12	1.21	84	2.14
In the United States	136	1.10	58	1.37
In the Army	159	1.08	188	1.78

In 1898 the rate of admission to sick report for the Army, regulars and volunteers, was 1.08 per thousand of strength, and in 1899, 1.78. The latter rate is higher than the mean annual rate of the decade 1888–1897, which was 1.17 per thousand, but it does not exceed the maximum rate of the decade, as may be seen from the following table, which shows that in 1892 the rate was 1.79 per thousand men:

Year.	Mean strength of command.	Total number of cases.	Ratio per thousand of strength.	Year.	Mean strength of command.	Total number of cases.	Ratio per thousand of strength.
1888	26,739	42	1.57	1896	27,183	22	0.81
1889	27,206	34	1.25	1897	27,374	21	.77
1890	26,684	33	1.24				
1891	26,460	37	1.40	Mean	27,117	31.7	1.17
1892	26,861	48	1.79				
1893	27,659	35	1.27	1898	147,795	159	1.08
1894	27,674	24	.87	1899	105,546	188	1.78
1895	27,326	21	.77				

The increase in the rate of admission in 1899 over the mean rate of the decade was due to a general rise in the rates, largest in Porto Rico (3.76 per thousand) and smallest in the United States (1.37 per thousand).

This increase was to have been expected, on account of the rapidity with which recruiting was effected during 1898 and 1899. It is well understood by army medical officers that among recruits there are always more mentally unsound men than among a similar number of civilians of the same age and physical development. The most careful physical examination often fails to detect a man whose brain works irregularly but who is sane enough to go to the recruiting office. Under the stimulus and excitement of the organization of troops many such men drift to the rendezvous, and must be eliminated after muster into service. Men excitable but not actually unbalanced lose their equilibrium under conditions of stress in the field, and the first two years of military life are apt to develop many such cases. Hence it was to be expected that the active recruiting of the past two years would bring into the ranks men who would increase the insanity admission rate of the Army. That this increase would be found chiefly

among those sent on foreign service was also to be expected. No doubt many young men, separated from home and friends, became the subjects of intense mental depression, and their cases were properly recorded on the monthly reports of sick and wounded as cases of insanity, and as the only method affording a prospect of recovery was a return to their homes they were judiciously shipped by transport to the United States. Many such cases recovered during the trans-Pacific voyage or during their detention for observation at the general hospital, Presidio of San Francisco, Cal., and never reached the Government Hospital for the Insane, at Washington, D. C. That this is no mere supposition may be inferred from the following statement concerning the insanity cases of the Army as a whole and of the Philippine army:

In the Army, regulars and volunteers, during the calendar years 1898 and 1899 there were reported on the monthly reports of sick and wounded 347 cases of insanity, and 202 of these cases, or 58.2 per cent, were committed to the Government Hospital for the Insane. One hundred and thirty-five cases, or 66.7 per cent of the commitments, recovered in an average period of 3.9 months, 13 were improved, 6 died, and 48 remained unimproved. Ninety-six of the 347 cases were reported on the monthly reports of troops serving in the Pacific islands, and 32 of these, or 33.3 per cent, were sent to the Government Hospital for the Insane. Seventeen cases, or 53.1 per cent of those committed, recovered in an average period of 3.6 months, 2 were improved, 2 died, and 11 remained under treatment.

It is not deemed necessary to do more than present these official figures to silence the sensational newspaper paragraphs which have been published during the past year relative to the unusual number of cases of insanity which have been returned to the United States from our troops operating in the Philippine Islands.

SPECIAL MEDICAL REPORTS.

The following list comprises the reports on medical subjects rendered by medical officers during the fiscal year ended June 30, 1900:

Name.	Rank.	Report.
Alden, Wm	Acting assistant surgeon	Pernicious malaria.
Appel, D. M	Major and surgeon	Laryngeal tuberculosis. Pulmonary tuberculosis, 6 cases. Weekly statement of gain and losses in weight of patients in general hospital, Fort Bayard, N. Mex. Pulmonary tuberculosis, 5 thermographs. Tuberculosis.
Armstrong, S. T	Major and surgeon, volunteers.	Yellow fever at Puerto Principe, Cuba.
Ashford, B. K	First lieutenant and assistant surgeon.	Ankylostomiasis.
Baker, David	do	Typhoid fever.
Beal, H. W	Acting assistant surgeon	Yellow fever, transport McClellan.
Bradley, A. E	Captain and assistant surgeon.	Diphtheria on hospital ship Relief.
Cardwell, H. W	Major and surgeon, volunteers.	Acute dysentery.
Carr, L. C	do	Yellow fever, Santiago, Cuba, 1899.
Cattermole, C. A	Acting assistant surgeon	Prevention of disease among soldiers.
Chamberlain, W. P	First lieutenant and assistant surgeon.	Malta fever, 2 cases.
Church, J. R	do	Zoster faciei.
Cogswell, Wm	Major and surgeon, volunteers.	Typhoid fever.
Cox, Walter	First lieutenant and assistant surgeon.	Malta fever.
Craig, Chas. F	Acting assistant surgeon	Report of bacteriological laboratory, U. S. general hospital, Presidio, San Francisco, Cal. Report on dysentery.

Name.	Rank.	Report.
Curry, J. J	Acting assistant surgeon	Malta fever. Blood examinations in typhoid fever.
Davis, John G	Major and surgeon, volunteers.	Chart, yellow fever and immigration.
Dougherty, J. C	Acting assistant surgeon	Yellow fever, 2 reports.
Drake, C. M	Major and surgeon, volunteers.	Variola.
Dudley, F. W	Acting assistant surgeon	Do.
Edger, B. J	First lieutenant and assistant surgeon.	Varioloid.
Fauntleroy, P. C	do	Report of Second Division field hospital, Eighth Army Corps, Angeles, P. I.
Flagg, C. E. B	Captain and assistant surgeon.	Variola. Tetanus. Pemphigus.
Forwood, W. H	Colonel and assistant surgeon-general	Inspection of general hospital, Presidio, San Francisco, Cal.
Fry, C. W	Acting assistant surgeon	Ptomaine poisoning on the transport City of Rio de Janeiro.
Gibson, E. T	do	Varioloid, 3 cases.
Girard, A. C	Major and surgeon	Report of autopsies performed at U. S. general hospital, Presidio, San Francisco, Cal., July 11 to Dec. 31, 1899, 41 cases. Autopsies made during January, 1900, 7 cases. Autopsies made during February, 1900, 11 cases. Autopsies made during April and May, 1900, 13 cases.
Godfrey, G. C. M	Captain and assistant surgeon.	Deaths, Pinar del Rio, Cuba, 1897 to 1900.
Gorgas, W. C	Major and surgeon	Map, yellow-fever cases, 1899. Yellow fever at Havana, Cuba, 1890 to 1900.
Grandy, L. B	Captain and assistant surgeon volunteers.	Variola.
Havard, V	Major and surgeon	Yellow fever at Santiago, Cuba. Yellow fever, Division of Cuba. Inspection, posts in Cuba. Yellow fever, Quemados, Cuba.
Howard, D. C	Captain and assistant surgeon.	Cerebro-spinal meningitis. Insanity.
Hicks, J. R	Acting assistant surgeon	Gonorrheal pneumonia. Pelvic abscess. Æstivo-autumnal malarial fevers, 2 cases.
Hodson, F. A	do	Cardiac asthma.
Hughes, L. S	do	Typhoid fever.
Ireland, M. W	Captain and assistant surgeon.	Do.
Jackson, Thos. W	Acting assistant surgeon	Malarial fevers at Pinar del Rio, Cuba.
Kean, J. R	Captain and assistant surgeon.	Types of fever at Columbia Barracks, Quemados, Havana, Cuba.
Kieffer, C. F	do	Variola.
Kulp, John S	do	Report of supplementary hospital, Manila, with photographic illustrations. Bubonic plague.
Laine, D. T	Acting assistant surgeon	Yellow fever, thermographs, 2 cases.
Maclean, D., jr	do	Chronic alcoholism.
Mason, Chas. F	Captain and assistant surgeon.	Pemphigus contagious on transport Grant. Results from glycerinated vaccine lymph. Sanitary corps, insurrecto army.
McCaw, W. D	do	Scarlet fever. Variola.
Metcalf, B. H	Acting assistant surgeon	Alcoholism.
Miller, W. G	do	Variola at Angel Island, September and October, 1899.
Morris, E. R	Captain and assistant surgeon.	Diphtheria. Scarlet fever. Tuberculosis.
Moseley, E. B	Major and surgeon	Variola.
Munson, E. L	Captain and assistant surgeon.	Army ration in the Tropics.
Norman, Seaton	Captain and assistant surgeon volunteers.	Variola.
Nunez, E. F	Acting asisstant surgeon	Yellow fever.
Peed, Geo. P	do	Typhoid fever.
Penrose, G. H	Major and surgeon, volunteers.	Beri-beri.
Perley, H. O	Major and surgeon	Work done on hospital ship Relief, January to May 31, 1900.
Poindexter, J. D	Captain and assistant surgeon.	Disposal of excreta in camps.
Pope, B. F	Lieutenant-colonel and deputy surgeon-general.	Measles at Columbus Barracks, Ohio.
Quinton, W. W	Captain and assistant surgeon.	Yellow fever.
Rossiter, P. S	Acting assistant surgeon	Yellow fever.
Saleeby, Najeeb M	do	Epidemic of fever at Columbia Barracks, Havana, Cuba.
Shafer, J. J	do	Chronic myocarditis.
Shellenberger, J. E	Major and surgeon, volunteers.	Variola.
Shimer, Ira A	First lieutenant and assistant surgeon.	Insanity.
Smith, Bat	Acting assistant surgeon	Report on yellow fever. Salol in yellow fever.

Name.	Rank.	Report.
Stark, A. N	Captain and assistant surgeon.	Yellow fever at Columbia Barracks, Havana, Cuba.
Strong, R. P	First lieutenant and assistant surgeon.	Etiology of dysentery in the Philippines.
Taylor, B. D	Major and surgeon	Bubonic plague, Honolulu, H. I.
Wells, G. M	Captain and assistant surgeon.	Ptomaine poisoning, 57 cases, San Juan, P. R.
Williams, R. E	Acting assistant surgeon	Variola.
Williamson, L	First lieutenant and assistant surgeon.	Yellow fever, 2 reports.
Wilson, C	Acting assistant surgeon	Typhoid fever at Aibonito, P. R.
Wilson, N. W	do	Measles. Locomotor ataxia.
Woodhull, A. A	Lieutenant-colonel and deputy surgeon-general.	Report of the medical department, Philippines, June 30, 1899.

INJURIES.

The number of injuries, with the discharges for disability and the deaths occasioned by them in the Army, regulars and volunteers, in the years 1898 and 1899 are here tabulated, together with the ratios per thousand of strength:

1898.

[Mean strength, 147,795.]

Injury.	Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Contusions and sprains	7,412	50.15	33	0.22	1	0.01
Dislocations	271	1.83	10	.07	1	.01
Fractures, not gunshot	790	5.35	28	.19	17	.12
Wounds, not gunshot	3,285	22.23	9	.06	13	.09
Wounds, gunshot	2,057	13.92	114	.77	302	2.04
Other injuries	6,932	46.90	232	1.57	112	.76
Total	20,747	140.38	426	2.88	446	3.03

1899.

[Mean strength, 105,546.]

Contusions and sprains	7,158	67.82	11	0.10		
Dislocations	243	2.30	4	.04		
Fractures, not gunshot	671	6.36	38	.36	14	0.13
Wounds, not gunshot	3,709	35.14	9	.09	23	.22
Wounds, gunshot	2,276	21.56	226	2.14	538	5.10
Other injuries	6,258	59.29	184	1.74	129	1.22
Total	20,315	192.47	472	4.47	704	6.67

The total number of injuries reported was nearly the same in both years, but the rate per thousand of strength is higher in 1899, because the mean strength of the Army was not so large in that year as in 1898. The rates of admission, 140.38 in 1898, and 192.48 in 1899, are smaller than the corresponding rate, 290.08, of the Regular Army in 1897, when the troops were on garrison duty at stations in the United States. That the injuries reported during a year of quiet garrison life are relatively more numerous than those recorded during a period when large commands were engaged in active and exhausting service is due to the care taken in times of peace to record the case of every man excused from any part of his military duty on account of sickness

or injury. During active service trivial cases receive medical attention at sick call, but are seldom taken up on the register of sick.

The increase in the rates of discharge for disability from injury in 1898 and 1899, as compared with 2.02 per thousand of strength in 1897, is due to gunshot injuries, which of themselves occasioned a rate of 2.14 in 1899.

Correspondingly the death rate of 1.61 in 1897 became increased to 3.02 and to 6.67 during the two following years.

More than one-third of the injuries consisted of contusions and sprains, but although 44 men were discharged for resulting disability during the two years, only one case of death was reported.

Incised wounds in 1898 caused a total of 1,191 admissions to sick report, with 10 deaths, equivalent to an admission rate of 8.06 and a death rate of 0.07 per thousand of strength, and in 1899 a total of 1,315 admissions, with 21 deaths, equivalent to an admission rate of 12.46 and a death rate of 0.20, as compared with 16.34 and 0.03, the respective average annual rates of the decade of peace 1888–1897. It is to be noted that 4 of these fatal wounds in 1899 were suicidal and 4 homicidal.

Included among these incised wounds are 21 cases reported as bolo wounds. Eight of these were almost immediately fatal, 9 were returned to duty, 2 discharged on certificates of disability, and 2 mustered out with their regiments.

Drowning. Thirty five deaths from drowning were reported in 1898, 13 from the Volunteer and 22 from the Regular Army. Ninety-nine deaths were reported in 1899, 19 volunteers and 80 regulars; 78 of the drownings occurred in the Philippines.

Exhaustion from fatigues and exposures occasioned 1,410 admissions to sick report in 1898 and 1,476 in 1899, equivalent to the respective rates of 9.54 and 13.98 per thousand of strength. Eleven deaths and 9 discharges were reported during the former year; 3 deaths, but no discharge, during the latter. The volunteers suffered from this cause considerably more than the regulars. Their admission rate in 1898 was 10.89, as compared with 6.61 among the regular troops, and in 1899, 17.37, as compared with 11.82. Most of these cases occurred in the Philippine Islands, where the rate per thousand of volunteer troops serving in those islands was 40.10.

Heat stroke occasioned 544 admissions in 1898, equal to 3.68 cases per thousand men, with 9 deaths and 12 discharges for disability, and in 1899, 204 admissions, equal to 1.93 cases per thousand, with 2 discharges but no death. The regulars were the heavier sufferers from this cause, their admission rate having been 5.34 in 1898, with 8 deaths and 3 discharges, as against a rate of 2.92 in the volunteers, with 1 death and 9 discharges, and 2.20 in 1899, as against the volunteer rate of 1.51, with 1 discharge and no death in each instance.

Hernia.—In the Army, regulars and volunteers, in 1898, 1,050 cases of rupture were reported, with 171 discharges and 2 deaths. The admission rate for the volunteers was 7.86 per thousand men and for the regulars only 5. This implies a higher grade of physique on the part of the latter. In 1899, however, the rate for the regulars, 7.57 per thousand, was nearly as high as that for the volunteers, 7.71, a result probably of hasty recruiting.

The following cases, additional to those published in previous annual reports from this office, have been operated on for the radical cure of

hernia. This list includes the cases of 53 regular soldiers, 17 volunteer soldiers, 4 in which the organization is not stated, and 5 civilians. Besides these cases reported specially, 19 cases are mentioned as having been operated on at the First Reserve Hospital, Manila. (See p. 327.)

Name.	Organization.	Age.	Hernia.	Date of operation.	Operator.
G. S.	Pvt., Ordnance		Right inguinal	Jan. 28, 1899	
J. M.	Corpl., D, 7th Cav		do	Mar. 5, 1899	
J. O.	Pvt., C, 2d Arty		Left inguinal	Mar. 29, 1899	Maj. Wm. H. Arthur, surgeon, U. S. A.
G. F. T.	Pvt., D, 2d Arty		do	do	
H. A.	Pvt., G, 15th Infty		Ventral	May 7, 1899	
G. A. F.	Pvt., Ordnance	28	Left inguinal	July 6, 1899	
W. A. M.	Cadet, U. S. M. A		Right inguinal	Aug. 22, 1899	
D. H. B.	do		do	Aug. 28, 1899	
R. P.	Pvt., band, U. S. M. A		Left inguinal	Oct. 20, 1899	
R. R.	Pvt., army service		Left femoral	Mar. 31, 1900	Maj. J. M. Banister, surgeon, U. S. A.
R. R.	do		Right femoral	May 10, 1900	
S. B. H.	Cadet, U. S. M. A		Right inguinal	May 15, 1900	
C. F. C.	do		do	May 13, 1900	
E. R. W.	Cadet, U. S. M. A		do	July 6, 1900	
C. A. P. H.	Major, 8th Cav	48	do	June 29, 1899	
A. E. C.	Pvt., C, 3d Arty	31	Ventral	Sept. 12, 1899	
C. M.	Saddler, M, 7th Arty	35	Left inguinal	Sept. 15, 1899	
W. H.	2d class pvt., Ordnance	46	do	Sept. 19, 1899	
A. A. C.	Civilian	31	Double inguinal	Oct. 10, 1899	
E. H.	Sergt., F, 7th Arty	37	Right inguinal	Nov. 3, 1899	
O. F.	Sergt., A, 5th Arty	39	do	Nov. 10, 1899	
J. W.	Pvt., Hospl. Corps	24	do	Nov. 24, 1899	Capt. W. C. Borden, assistant surgeon, U. S. A.
A. D. M.	Pvt., C, 19th Infty	27	Ventral	Jan. 12, 1900	
H. G. L.	1st lieut., 24th Infty	34	Left inguinal	Feb. 2, 1900	
W. H. J.	Civilian	25	Right inguinal	Feb. 9, 1900	
M. J.	Pvt., H, 2d Arty	27	do	Mar. 13, 1900	
O. O. M.	2d class pvt., Engineers	24	Double inguinal	May 30, 1900	
P. F.	Pvt., C, 4th Arty	24	Left inguinal	June 8, 1900	
R. R.	Pvt., G, 2d Infty	22	Right inguinal	June 12, 1900	
P. M. K.	Civilian	52	Double inguinal	June 19, 1900	
M. S. H.	do	38	Right inguinal	June 20, 1900	
C. J.	Pvt., D, 24th Infty		do	Apr. 1, 1900	Capt. A. E. Bradley, assistant surgeon, U. S. A.
C. N.	Band, U. S. M. A		Left inguinal	Feb. 2, 1899	First Lieut. D. F. Duval, assistant surgeon, U. S. A.
C. S.	Pvt., M, 24th Infty	21	Inguinal	Dec. 2, 1899	Maj. R. G. Ebert, surgeon, U. S. A.
J. E. K.	Sergt., F, 13th Minn. Vols		Right inguinal	Apr. 14, 1899	Maj. R. J. Fitzgerald, surgeon, U. S. V.
R. A. D.	Pvt., A, 13th Minn. Vols		do	June 6, 1899	
L.			do	Jan. 31, 1900	Capt. C. E. B. Flagg, assistant surgeon, U. S. A.
			do	Feb. 1, 1900	
			do	Jan. 24, 1900	
G. M.	Pvt., 25th Infty		do	Aug. 15, 1899	Col. Wm. H. Forwood, assistant surgeon-general, U. S. A.
F. N. F.	Rect., unassigned		do	July 9, 1899	
M. S.			do	Aug. 15, 1899	
E. H.	P. Co., 10, Cas. Detch		do	do	
W. H.	Q, Sergt., 1st N. D. V. I		do	do	
S. J. L.	Pvt., 1st Colo. V. I		Left inguinal	Aug. 16, 1899	
S. V.	Pvt., K, 1st Colo. V. I		Double inguinal	Aug. 30, 1899	
L. W. K.	Pvt., I, 20th Kans. V. I		Right inguinal	Sept. 3, 1899	
L. W. W.	Pvt., M, 1st Cal. V. I		Left inguinal	do	
C. W. N.	Sergt., G, 1st N. D. V. I		Right inguinal	Sept. 7, 1899	
A. H. H.	Corpl., B, 1st N. D. V. I		Left inguinal	do	
C. C.	Sergt., 9th Cav		do	Sept. 9, 1899	
N. P. S.	Pvt., D, 1st Cal. H. A		do	do	
C. K.	Wag., D, 1st S. D. V. I		Right inguinal	Sept. 16, 1899	
L. O.	Pvt., A, 1st Idaho V. I		Left inguinal	do	Maj. A. C. Girard, surgeon, U. S. A.
W. McL.	2d lieut., 1st N. D. V. I		do	Sept. 19, 1899	
L. P. A.	Pvt., A, 1st Cal. H. A		Right inguinal	Oct. 11, 1899	
T. McC.	Pvt., A, 1st Idaho V. I		do	do	
F. J. M.	Pvt., G, 45th Infty		Left inguinal	Nov. 2, 1899	
O. L. B.	Pvt., B, 22d Infty		do	Dec. 4, 1899	
H. H. S.	Discharged soldier		do	Feb. 10, 1900	
E. B. B.	Capt., I, 16th Infty		Right inguinal	Feb. 12, 1900	
E. H. J.	Discharged soldier		do	Feb. 27, 1900	
D. F. A.	Capt., 12th Infty		Left inguinal	Apr. 14, 1900	
L. B.	Pvt., N, 6th Arty		do	do	
A. J. C.	Pvt., Hospl. Corps		Right inguinal	Apr. 24, 1900	
H. W. B.	Pvt., O, 3d Arty		do	Apr. 28, 1900	
R. B.	Pvt., B, 16th Infty		do	May 26, 1900	
W. E. B.	Act. hospl. steward		Left inguinal	do	
P. K.	Pvt., Ordnance		Double inguinal	June 11, 1900	

Name.	Organization.	Age.	Hernia.	Date of operation.	Operator.
L. E. C.	Pvt., 29th Kans. V. I		Right inguinal	Aug. 15, 1899	Capt. Henry A. Shaw, assistant surgeon, U. S. A.
E. B.	Pvt., M, 10th Cav		Left inguinal	Jan. 18, 1900	First Lieut. Ira A. Shimer, assistant surgeon, U. S. A.
T. M.	do		do	do	
T. McG.	General prisoner		Right inguinal	Jan. 23, 1900	
F. H.	Pvt., D, 8th Infty	49	Left inguinal	Feb. 25, 1900	
P. C.	Pvt., H, 7th Cav	26	Double inguinal	Mar. 31, 1900	Capt. A. N. Stark, assistant surgeon, U. S. A.
J. E. McG.	Mus., F, 2d Arty	48	Left inguinal	Apr. 18, 1900	
G. G. S.	Act. hospl. steward		Right inguinal	May 27, 1900	
J. E. F.	Civilian		Left inguinal	June 3, 1900	
R. B.	Corpl., B, 1st Arty		do	Jan. 12, 1900	Capt. Charles Willcox, assistant surgeon, U. S. A.

GUNSHOT INJURIES.

Regular Army, 1898.—During the calendar year 1898 there were reported from the Regular Army 1,457 gunshot injuries, 1,320 of which were battle casualties and 137 the result of accidents, quarrels, attempted suicide, etc.

Of the battle wounds, 1,221 were said to have been caused by bullets, 83 by shell, and 16 by shrapnel. In 57 cases the site and extent of the wounds were not stated. Flesh wounds in various parts of the body numbered 860, constituting 68.1 per cent of the total number in which the site of the wound was stated; 85 were penetrating wounds of the thorax or abdomen; 41 fractures of the cranial or facial bones, and 7 of the spine; 140 fractures of the upper extremity, in 86 of which only the metacarpus or fingers were involved; 130 fractures of the lower extremity, the shaft of the femur being involved in 26, the kneejoint in 17, the leg and ankle in 34, and the metatarsus and toes in 53.

The site and character of these wounds and the manner in which the completed cases were terminated are stated in my last annual report, pages 308–314.

Volunteer Army, 1898.—In the volunteer force during the calendar year 1898, 689 gunshot injuries were reported. Eighty-nine of these were immediately fatal and were not taken up on the reports of sick and wounded.

Of the 600 cases taken on sick report, 29, or 4.8 per cent, ended fatally; 4 ended in death, but from other causes than the gunshot injury; 437 were returned to duty; 18 were discharged on certificates of disability in 1898, and 8 others in 1899; 7 were discharged by order, and the injured men in 97 cases were mustered out with their regiments.

Of the 600 cases, 362 were battle wounds, 250 of which ended in return to duty, 12 in death as the result of the wounds, and 4 in death from other causes. Six of the wounded men were discharged on certificates of disability in 1898 and 3 others in 1899. Three were discharged by order and 84 were mustered out with their regiments.

Of the 600 cases 238 were not battle wounds, but 208 of them were reported as having been incurred in the line of duty.

Flesh wounds in various parts of the body numbered 412, or 68.7 per cent of the whole number of cases.

Of 8 fractures of the bones of the cranium 4 terminated fatally. Of 6 fractures of the bones of the face 1 proved fatal from secondary hemorrhage after ligation of the lingual artery. Of 13 wounds of the neck 3 were fatal. Of 2 fractures of the spine both patients died.

the only operative proceedings recorded being the removal of spiculæ of bone in one of the cases.

Thirty-two penetrating wounds of the thorax were reported, of which 6 were fatal. A rib was resected in 1 case for empyema, with a favorable result.

Of 12 penetrations of the abdomen 2 ended favorably without surgical intervention and 10 were fatal. Among the latter was 1 in which the abdomen was opened and 1 in which a portion of the injured intestine was resected.

In 9 cases of fractured humerus, none fatal, the operative work consisted of amputation in 2 cases, removal of fragments of bone in 1 case, and an incision for drainage in 1 case. In 12 fractures of the forearm amputation was performed in 2 cases, fragments of bone removed in 1 case, and the bullet was removed in 2 cases, in 1 of which the X ray was used for the discovery of the missile. In 25 cases of fractured fingers amputation was performed in 11 cases.

Nine fractures of the femur, none fatal, were reported. Amputation and reamputation were performed in 1 case, and the missile or fragments of bone were extracted in 3 cases. The kneejoint was injured in 9 cases, in 1 of which the joint was opened and drained. The leg was fractured in 7 cases, in 1 of which amputation was performed. The tarsus and metatarsus were fractured in 5 cases, necessitating amputation in one instance, and the toes were fractured in 3 cases, all of which required amputation.

In a flesh wound of the lumbar region the bullet was discovered by the X ray, but was not removed.

The following tabulations give the details of these gunshot injuries:

Killed by gunshot.

VOLUNTEER ARMY, 1898.

Character and location of wounds.	How received.						Nature of missile.					
		Not in action.					In action.			Not in action.		
	In action.	In line of duty.	Not in line of duty.	Suicide.	Homicide.	Total.	Mauser.	Bullets not stated.	Shell.	Bullet.	Revolver.	Shrapnel.
Head fracture	12	3	.....	1	2	18	3	9	....	4	1	1
Face fracture	1	.....	.....	.....	.....	1	1	.....	.....	.....	.....	.....
Neck	.....	1	.....	.....	.....	1	.....	.....	.....	1	.....	.....
Thorax, penetrating	9	1	.....	4	6	20	1	8	....	11	.....	.....
Abdomen, penetrating	7	1	.....	1	1	10	3	2	2	3	.....	.....
Thigh fracture, upper third	1	.....	.....	.....	.....	1	.....	1	....	.....	.....	.....
Unknown	25	8	.....	2	3	38	8	17	....	13	.....	.....
Total	55	14	.....	8	12	89	16	37	2	32	1	1

Gunshot wounds which terminated fatally.

VOLUNTEER ARMY, 1898.

Character and location of wound.	How received.						Nature of missile.			
	In action.	Not in action.				Total.	In action.		Not in action.	
		In line of duty.	Not in line of duty.	Suicide.	Homicide.		Mauser.	Bullets not stated.	Bullet.	Revolver.
Head fracture	4					4	3	1		
Face fracture	1					1		1		
Neck	1	2				3	1		1	1
Spine fracture	2					2	1	1		
Thorax, penetrating	2	2	1	1		6	1	1	4	
Abdomen, penetrating	2	7			1	10	1	1	5	3
Thigh, flesh		1				1			1	
Kneejoint			1			1			1	
Leg, flesh			1			1			1	
Total	12	12	3	1	1	29	7	5	13	4

Gunshot wounds received in action.

VOLUNTEER ARMY, 1898.

Character and location of wound.	Nature of missile.						Disposition.						
	Mauser.	Remington.	Bullets, other.	Shell.	Shrapnel.	Piece of steel.	Total.	Duty.	Certificate of disability.	Died.	Discharged by order.	Mustered out.	Deaths, other causes.	Total.
Head:														
Flesh	13	....	12	2	2	....	29	26	....	....	....	2	1	29
Fracture	6	....	1	....	....	....	7	....	....	4	....	2	1	7
Face:														
Flesh	4	....	....	2	1	....	7	6	....	....	....	1	....	7
Fracture	....	....	5	....	....	....	5	3	....	1	1	....	....	5
Neck	5	....	4	....	....	....	9	6	....	1	....	2	....	9
Spine, fracture	1	....	1	....	....	....	2	....	....	2	....	....	....	2
Thorax:														
Nonpenetrating	9	....	3	1	1	....	14	10	....	....	....	3	1	14
Penetrating	14	....	8	....	....	....	22	9	1	2	....	10	....	22
Abdomen:														
Nonpenetrating	2	....	....	1	....	....	3	3	....	....	....	....	....	3
Penetrating	2	....	2	....	....	....	4	2	....	2	....	....	....	4
Back and hip, flesh	6	....	7	....	....	....	13	9	....	....	....	4	....	13
Perineum, genital and urinary organs	2	....	1	....	....	....	3	2	....	....	1	....	....	3
Shoulder:														
Flesh	18	....	12	2	1	....	33	26	1	....	....	5	1	33
Fracture, clavicle or scapula	....	....	2	....	....	....	2	1	....	....	....	1	....	2
Arm:														
Flesh	12	....	17	1	1	....	31	23	1	....	1	6	....	31
Fracture	3	....	....	....	1	1	5	2	....	....	....	3	....	5
Elbow joint	....	....	1	....	....	....	1	1	....	....	....	....	....	1
Forearm:														
Flesh	7	....	9	....	2	....	18	16	....	....	....	2	....	18
Fracture	4	....	3	1	....	....	8	2	....	....	....	6	....	8
Hand, flesh	10	....	13	....	1	....	24	20	2	....	....	2	....	24
Carpus and metacarpus, fracture	1	....	1	....	....	....	2	1	....	....	....	1	....	2
Fingers, fracture	3	....	6	....	....	....	9	3	....	....	....	6	....	9
Thigh:														
Flesh	19	2	21	1	2	....	45	37	....	....	....	8	....	45
Fracture, upper third	2	....	1	....	....	....	3	1	1	....	....	1	....	3
Fracture, middle third	3	....	1	....	....	....	4	2	....	....	....	2	....	4
Fracture, lower third	....	....	....	1	....	....	1	....	1	....	....	....	....	1
Kneejoint	1	....	3	....	1	....	5	4	....	....	....	1	....	5
Leg:														
Flesh	9	....	12	2	1	....	24	16	....	....	....	8	....	24
Fracture	5	....	....	....	....	....	5	1	1	....	....	3	....	5
Foot, flesh	6	1	7	....	....	....	14	12	1	....	....	1	....	14
Tarsus and metatarsus, fracture	1	....	1	1	....	....	3	2	....	....	....	1	....	3
Unknown	....	....	7	....	....	....	7	4	....	....	....	3	....	7
Total	168	3	161	15	14	1	362	250	9	12	3	84	4	362

Gunshot wounds other than battle wounds.

VOLUNTEER ARMY, 1898.

Character and location of wound.	How received.					Nature of missile.							Disposition.					
	In line of duty.	Not in line of duty.	Suicidal.	Homicidal.	Total.	Krag-Jörgensen.	Bullets, other.	Revolver.	Small shot.	Shell.	Shrapnel.	Total.	Duty.	Certificate of disability.	Died.	Discharged by order.	Mustered out.	Total.
Head:																		
Flesh	3	2			5		5					5	5					5
Fracture		1			1			1				1	1					1
Face:																		
Flesh	4				4		4					4	4					4
Fracture	1				1		1					1		1				1
Neck	3	1			4		2	2				4	2		2			4
Thorax:																		
Nonpenetrating	9	2			11		11					11	10				1	11
Penetrating	8	1	1		10		10					10	2	2	4		2	10
Abdomen:																		
Nonpenetrating	1	1			2		2					2	2					2
Penetrating	7			1	8		5	3				8			8			8
Back and hip, flesh	8	1			9		8	1				9	9					9
Perineum, genital and urinary organs	3				3		2	1				3	2				1	3
Shoulder:																		
Flesh	7				7		6	1				7	6				1	7
Arm:																		
Flesh	5	2			7		6		1			7	7					7
Fracture	4				4		3	1				4	3	1				4
Elbow joint	1				1		1					1	1					1
Forearm:																		
Flesh	10	2			12		11	1				12	11				1	12
Fracture	4				4		4					4	1	2			1	4
Wrist joint		1			1		1					1	1					1
Hand, flesh	30	2			32	1	19	10	1	1		32	29	1		1	1	32
Carpus and metacarpus, fracture	1				1		1					1	1					1
Fingers, fracture	15	1			16		12	2		1	1	16	11	5				16

Thigh:																		
Flesh	21	3			24		16	8				24	22		1	1		24
Fracture middle third	1				1		1					1		1				1
Kneejoint	2	2			4		3	1				4	2	1	1			4
Leg:																		
Flesh	32	2			34		32	1		1		34	30	1	1		2	34
Fracture	1	1			2		1	1				2		1		1		2
Foot, flesh	18	3			21		17	4				21	17	1		1	2	21
Tarsus and metatarsus, fracture	2				2			2				2	2					2
Toes, fracture	3				3		3					3	3					3
Unknown	4				4		1					4	3				1	4
Total	208	28	1	1	238	1	191	40	2	3	1	238	187	17	17	4	13	238

All gunshot wounds.

VOLUNTEER ARMY, 1898.

Character and location of wound.	How received.						Nature of missile.									Disposition.						
	In action.	Not in action.				Total.	Mauser.	Remington.	Krag-Jörgensen.	Bullets, other.	Revolver.	Shotgun.	Shell.	Shrapnel.	Piece of steel.	Total.	Duty.	Certificate of disability.	Died.	Discharged by order.	Mustered out.	Deaths, other causes.	Total.
		In line of duty.	Not in line of duty.	Suicidal.	Homicidal.																		
Head:																							
Flesh	29	3	2	....	....	34	13	....	....	17	....	....	2	2	....	34	31	....	....	....	2	1	34
Fracture	7	....	1	....	....	8	6	....	....	1	1	....	....	....	....	8	1	....	4	....	2	1	8
Face:																							
Flesh	7	4	....	....	....	11	4	....	....	4	....	....	2	1	....	11	10	....	....	....	1	....	11
Fracture	5	1	....	....	....	6	....	....	....	6	....	....	....	....	....	6	3	1	1	1	....	....	6
Neck	9	3	1	....	....	13	5	....	....	6	2	....	....	....	....	13	8	....	3	....	2	....	13
Spine, fracture	2	....	....	....	....	2	1	....	....	1	....	....	....	....	....	2	....	....	2	....	....	....	2
Thorax:																							
Nonpenetrating	14	9	2	....	....	25	9	....	....	14	....	....	1	1	....	25	20	....	....	....	4	1	25
Penetrating	22	8	1	1	....	32	14	....	....	18	....	....	....	....	....	32	11	3	6	....	12	....	32
Abdomen:																							
Nonpenetrating	3	1	1	....	....	5	2	....	....	2	....	....	1	....	....	5	5	....	....	....	....	....	5
Penetrating	4	7	....	....	1	12	2	....	....	7	3	....	....	....	....	12	2	....	10	....	....	....	12
Back and hip, flesh	13	8	1	....	....	22	6	....	....	15	1	....	....	....	....	22	18	....	....	....	4	....	22
Perineum, genital and urinary organs	3	3	....	....	....	6	2	....	....	3	1	....	....	....	....	6	4	....	....	1	1	....	6
Shoulder:																							
Flesh	33	7	....	....	....	40	18	....	....	18	1	....	2	1	....	40	32	1	....	....	6	1	40
Fracture clavicle or scapula	2	....	....	....	....	2	....	....	....	2	....	....	....	....	....	2	1	....	....	....	1	....	2
Arm:																							
Flesh	31	5	2	....	....	38	12	....	....	23	....	1	1	1	....	38	30	1	....	1	6	....	38
Fracture	5	4	....	....	....	9	3	....	....	3	1	....	....	1	1	9	5	1	....	....	3	....	9
Elbow joint	1	1	....	....	....	2	....	....	....	2	....	....	....	....	....	2	2	....	....	....	....	....	2
Forearm:																							
Flesh	18	10	2	....	....	30	7	....	....	20	1	....	....	2	....	30	27	....	....	....	3	....	30
Fracture	8	4	....	....	....	12	4	....	....	7	....	....	1	....	....	12	3	2	....	....	7	....	12
Wrist joint	....	....	1	....	....	1	....	....	....	1	....	....	....	....	....	1	1	....	....	....	....	....	1
Hand, flesh	24	30	2	....	....	56	10	....	1	32	10	1	1	1	....	56	49	3	....	1	3	....	56
Carpus and metacarpus, fracture	2	1	....	....	....	3	1	....	....	2	....	....	....	....	....	3	2	....	....	....	1	....	3
Fingers, fracture	9	15	1	....	....	25	3	....	....	18	2	....	1	1	....	25	14	5	....	....	6	....	25

Thigh:																							
Flesh	45	21	3	....	....	69	19	2	....	37	8	....	1	2	....	69	59	....	[1] 1	1	8	....	69
Fracture upper third	3	....	....	....	....	3	2	....	....	1	....	....	....	....	....	3	1	1	....	....	1	....	3
Fracture middle third	4	1	....	....	....	5	3	....	....	2	....	....	....	....	....	5	2	1	....	....	2	....	5
Fracture lower third	1	....	....	....	....	1	....	....	....	....	....	....	1	....	....	1	....	1	....	....	....	....	1
Kneejoint	5	2	2	....	....	9	1	....	....	6	1	....	....	1	....	9	6	1	[2] 1	....	1	....	9
Leg:																							
Flesh	24	32	2	....	....	58	9	....	....	44	1	....	3	1	....	58	46	1	[3] 1	....	10	....	58
Fracture	5	1	1	....	....	7	5	....	....	1	1	....	....	....	....	7	1	2	....	1	3	....	7
Foot, flesh	14	18	3	....	....	35	6	1	....	24	4	....	....	....	....	35	29	2	....	1	3	....	35
Tarsus and metatarsus, fracture	3	2	....	....	....	5	1	....	....	1	2	....	1	....	....	5	4	....	....	....	1	....	5
Toes, fracture	....	3	....	....	....	3	....	....	....	3	....	....	....	....	....	3	3	....	....	....	....	....	3
Unknown	7	4	....	....	....	11	....	....	....	11	....	....	....	....	....	11	7	....	....	....	4	....	11
Total	362	208	28	1	1	600	168	3	1	352	40	2	18	15	1	600	437	26	29	7	97	4	600

[1] Shot through left thigh, accidentally, caliber .45, August 15; died next day.
[2] Shot through left knee, while resisting arrest, caliber .45, September 27; died October 15.
[3] Shot through left leg, while intoxicated, November 11; died of tetanus November 24.

Surgical intervention and results, with missile.

VOLUNTEER ARMY, 1898.

Character and location of wounds.	Operation.	Results.		Missile.					
		Recovered.	Died.	Mauser.	Bullet.	Revolver.	Shell.	Shrapnel.	Piece of steel.
Face, fracture	Right lingual artery ligated		1		1				
Spine, fracture	Spicula of bone removed		1		1				
Thorax, penetrating	Resection fifth rib for empyema	1		1					
Abdomen, penetrating	Abdominal incision		1			1			
Do	Resection of the intestine		1			1			
Back and hip, flesh	Fragment of metal discovered in lumbar region by X-ray; missile not removed.	1			1				
Arm, fracture	2 amputations	2			2				
Do	Fragments of bone removed	1							1
Do	Incision for drainage	1						1	
Forearm, fracture	Amputation	1					1		
Do	do	1			1				
Do	Crushed bone removed	1			1				
Do	Bullet discovered by X-ray and removed.	1		1					
Do	Bullet removed	1		1					
Fingers, fracture	9 amputations	9			9				
Do	1 amputation	1					1		
Do	do	1				1			
Thigh:									
Fracture, upper third	Bullet removed	1		1					
Fracture, middle third	Bullet and dead bone removed	1		1					
Do	Spiculæ of bone and 2 pieces of lead removed.	1			1				
Fracture, lower third	Amputation and reamputation	1					1		
Knee joint	Knee joint opened and drained	1						1	
Leg, fracture	Amputation	1			1				
Tarsus and metatarsus, fracture.	do	1					1		
Toes, fracture	3 amputations	3			3				

Regular and Volunteer armies, 1899.—During the year 1899 there were reported from the Army, regulars and volunteers, 2,276 cases of gunshot injury, with 149 deaths, or 6.5 per cent, resulting from the wounds and 4 deaths from causes other than the wounds; 1,714 were returned to duty, 180 were discharged on certificates of disability, 134 by order, and 80 by muster out or expiration of term of service, while 15 remained on sick report at the date of the latest reports.

In addition to these cases, there were killed by gunshot 391 men whose names were not on sick report at the time of their death.

Of the 2,276 cases, 1,759 were wounds received in action; 517 were not battle wounds, but 411 of them were received in the line of duty. One hundred and sixteen of the battle wounds, or 6.6 per cent, had a fatal ending and 136 terminated in discharge for disability.

Of the 2,276 cases, 1,016 occurred among the regular troops, 712 in action, 232 in line of duty, and 72 not in the line of duty. Four of the last-mentioned cases were suicidal and 3 homicidal.

Of the 1,016 cases among the regular troops, 795 were returned to duty, 59 died from effects of their wounds and 3 from other causes, 129 were discharged for disability, 18 by order, and 3 by expiration of term of service, while 9 remained on sick report at the date of last report.

Of the 2,276 cases, 1,260 occurred among the volunteer troops, 1,047 in battle, 179 in the line of duty and 34 not in the line of duty. Only one of the last-mentioned cases was suicidal, none homicidal.

Of the 1,260 cases among the volunteer troops, 919 were returned to duty; 90 died from the effects of their wounds and 1 from other causes, 51 were discharged on certificates of disability, 116 by order, and 77 by muster out, while 6 remained on sick report at the date of last report.

Of the 391 killed by gunshot injury, 333 died in battle, 28 in the line of duty, and 30 not in the line of duty. Fifteen of those last mentioned were cases of suicide and 13 cases of homicide.

Of the 391 killed, 189 were regulars, and of these 148 died in battle, 17 in the line of duty, and 24 not in the line of duty. Ten of those last mentioned were cases of suicide and 12 were cases of homicide.

Of the 391 killed, 202 were volunteers, of whom 185 died in battle, 11 in the line of duty, 5 by suicide, and 1 by homicide.

The site and character of the fatal injury was not reported in 22 of the 391 cases. Of 369 cases in which the location of the injury is specified, 145, or 39.3 per cent, were shot in the head; 131, or 35.5 per cent, in the thorax; 54, or 14.6 per cent, in the abdomen, and 28, or 7.6 per cent, in the neck. The following tabulations show the reported nature of these immediately fatal injuries:

Killed by gunshot.

REGULAR AND VOLUNTEER ARMIES, 1899.

Character and location of wound.	How received.						Nature of missile.									
		Not in action.					In action.						Not in action.			
	In action.	In line of duty.	Not in line of duty.	Suicide.	Homicide.	Total.	Mauser.	Remington.	Krag-Jörgensen.	Bullets, other.	Shell.	Cannon projectile.	Krag-Jörgensen.	Bullets, other.	Revolver.	Shotgun.	Explosion of gun cotton.
Head, fracture	126	6	1	11	1	145	33	20	....	72	...	1	6	9	4	...	....
Face, fracture	1	....	....	....	....	1	....	1	....	....	....	....	....	....	....	....	....
Neck	24	2	....	....	2	28	7	3	....	14	....	....	1	1	2	....	....
Spine, fracture	....	1	....	....	....	1	....	....	....	....	....	....	....	....	....	1	....
Thorax, penetrating	108	13	1	1	8	131	39	23	1	45	....	....	6	11	6	....	....
Abdomen, penetrating	51	2	....	....	1	54	16	8	....	27	....	....	....	2	1	....	....
Pelvis, fracture	1	1	....	....	....	2	1	....	....	....	....	....	....	1	....	....	....
Thigh:																	
Flesh	3	1	....	....	....	4	1	....	....	2	....	....	1	....	....	....	....
Fracture, upper third	2	....	....	....	....	2	1	....	....	....	1	....	....	....	....	....	....
Leg, fracture	1	....	....	....	....	1	....	....	....	....	1	....	....	....	....	....	....
Unknown	16	2	....	3	1	22	1	....	....	15	....	....	....	3	2	....	1
Total	333	28	2	15	13	391	99	55	1	175	2	1	14	27	15	1	1

REGULARS, 1899.

Head, fracture	60	3	1	7	1	72	17	15	....	27	...	1	4	5	3	...	....
Face, fracture	1	....	....	....	....	1	....	1	....	....	....	....	....	....	....	....	....
Neck	10	2	....	....	2	14	5	2	....	3	....	....	1	1	2	....	....
Spine, fracture	....	1	....	....	....	1	....	....	....	....	....	....	....	....	....	1	....
Thorax, penetrating	50	8	1	1	8	68	20	18	1	11	....	....	6	8	4	....	....
Abdomen, penetrating	22	1	....	....	1	24	7	5	....	10	....	....	....	1	1	....	....
Pelvis, fracture	1	....	....	....	....	1	1	....	....	....	....	....	....	....	....	....	....
Thigh, fracture upper third	2	....	....	....	....	2	1	....	....	....	1	....	....	....	....	....	....
Leg, fracture	1	....	....	....	....	1	....	....	....	....	1	....	....	....	....	....	....
Unknown	1	2	....	2	....	5	1	....	....	....	....	....	....	1	2	...	1
Total	148	17	2	10	12	189	52	41	1	51	2	1	11	16	12	1	1

Killed by gunshot—Continued.

VOLUNTEERS, 1899.

Character and location of wound.	How received.					Nature of missile.										
	Not in action.					In action.						Not in action.				
	In action.	In line of duty.	Not in line of duty.	Suicide.	Homicide.	Total.	Mauser.	Remington.	Krag-Jörgensen.	Bullets, other.	Shell.	Cannon projectile.	Krag-Jörgensen.	Bullets, other.	Revolver.	Shotgun.	Explosion of gun cotton.
Head, fracture	66	3	....	4	....	73	16	5	....	45	.....	.....	2	4	1	.....	.....
Neck	14	....	....	.....	.....	14	2	1	....	11	.....	.....	.....	.....	.....	.....	.....
Thorax, penetrating	58	5	....	.....	.....	63	19	5	....	34	.....	.....	.....	3	2	.....	.....
Abdomen, penetrating	29	1	....	.....	.....	30	9	3	....	17	.....	.....	.....	1	.....	.....	.....
Pelvis, fracture	.....	1	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....
Thigh, flesh	3	1	....	.....	.....	4	1	.....	.....	2	.....	.....	1	.....	.....	.....	.....
Unknown	15	.....	....	1	1	17	.....	.....	.....	15	.....	.....	.....	2	.....	.....	.....
Total	185	11	....	5	1	202	47	14	....	124	.....	.....	3	11	3	.....	.....

Of the 2,276 gunshot wounds on the sick reports of the Army, regulars and volunteers, in 1899, the site of injury in 8 cases is not stated. In 2,268 cases in which the injured part is specified, the head, face, or neck was wounded in 257 cases, or 11.4 per cent of the whole number; the trunk in 402 cases, or 17.7 per cent; the upper extremity in 763 cases, or 33.6 per cent, and the lower extremity in 846 cases, or 37.3 per cent. But if the 369 cases of death from gunshot in which the site of the fatal wound is specified be added to these 2,268 cases, we have a total of 2,637 cases of gunshot injury, of which 431 injuries of the head, face, and neck constituted 16.4 per cent of the total; 590 of the trunk, 22.4 per cent; 763 of the upper extremity, 28.9 per cent, and 853 of the lower extremity 32.3 per cent.

But a more accurate view of the relative liability of various parts of the body to gunshot injury may be obtained if to the gunshot injuries received in 1899 be added those incurred by the regular and volunteer troops during the year 1898. This gives a total of 4,919 injuries, 845 of which were fatal. The aggregate number of cases in which the location and character of the injury was stated amounted to 4,756, with 757 deaths. The following tabulation shows the distribution of these wounds according as the head, face, and neck, the trunk, or the extremities were the parts injured:

Liability of various parts of the body to gunshot injury, and the dangers resulting from such wounds, years 1898 and 1899.

Site of injury.	Cases.		Deaths.		
	Number.	Per cent of all cases of known sites.	Number.	Per cent of cases of local injury.	Per cent of all cases of known sites.
Head, face, and neck	726	15.26	298	41.05	6.27
Trunk	1,065	22.39	409	38.41	8.60
Upper extremities	1,410	29.65	9	.64	.19
Lower extremities	1,555	32.70	41	2.64	.86
Total known sites	4,756	100.00	757	15.92	15.92
Not stated	163	.....	88	.....	.....
Aggregate	4,919	.....	845	.....	.....

Among the 2,276 gunshot wounds entered on the registers during the calendar year 1899 were 197 injuries of the head and face; 141 of these were flesh wounds, 29 fractures of the cranial bones, and 27 fractures of the bones of the face. No flesh wound was fatal, but the eye had to be enucleated in one of the cases. Fifteen of the patients with cranial fractures died (1 of these in 1900) and 5 recovered, so as to be able to resume their military duties. Depressed bone was removed in 2 cases, one of which was fatal. Enucleation of the eye was performed in 1 case, and the wound is reported as having been closed by sutures in 1 case. Of those who suffered fractures of the facial bones 7 resumed their military duties and 2 died. The recorded surgery in fractures of these bones consisted of the removal of fragments of bone and of portions of a Mauser bullet in 1 case, which ended fatally; the removal of a bullet through the floor of the mouth in 1 case, and enucleation of the eye in 1 case.

Of 60 cases of wound of the neck 41 were returned to duty and 12 died. The only surgical work recorded was the removal of the missile in 2 cases.

Eleven fractures of the spine were reported—8 fatal. The missile was removed in 1 case which recovered and in 1 case which was fatal. Laminectomy was performed in 1 case, which also was fatal. See page 326.

The thorax was injured in 197 cases, 84 nonpenetrating and 113 penetrating wounds. Of the nonpenetrating wounds 1 proved fatal after an operation for traumatic aneurism and 1 recovered after a ligation of the subclavian artery. Of the penetrating wounds 36 cases, or 31.9 per cent of the penetrations, were fatal. The bullet was removed in 1 case which ended fatally and in 6 cases which recovered. The seventh rib was resected in 1 case, and the axillary artery was tied in 1 case with a favorable result.

If the penetrating wounds of the thorax reported in 1898 be added to those just mentioned, the fatal cases are found to constitute 27 per cent of the aggregate. Thus the regular troops in 1898 had 53 cases, 13 fatal, and the volunteer troops 32 cases, 6 fatal, while, as just stated, the regulars and volunteers in 1899 reported 113 cases, 36 fatal. The aggregate number of deaths, 55, forms 27 per cent of the aggregate number of cases, 198.

Of 98 wounds of the abdomen in 1899, 38 were nonpenetrating and 60 penetrating wounds. None of the former was fatal, but 41 of the latter died, constituting 68.3 per cent of the whole number of penetrating wounds. Surgical intervention in these penetrating abdominal wounds included the removal of the missile in 2 cases, the discovery of the bullet by the X-rays in 1 case, and laparotomy in 5 cases, 4 of which were fatal. For the successful case see page 326. In 10 of the 60 penetrating wounds the injured men were able to return to military duty, and in 8 other cases the patients survived the injury.

If the penetrating wounds of the abdomen reported in 1898 be added to those just mentioned, the fatal cases are found to constitute 70 per cent of the aggregate. Thus the regular troops in 1898 had 44 cases, 30 fatal, and the volunteer troops 12 cases, 10 fatal, while, as just stated, the regulars and volunteers in 1899 had 60 cases, 41 fatal. The aggregate number of deaths, 81, forms 70 per cent of the aggregate number of cases, 116.

In one of the gunshot wounds of 1899 the bladder was sutured. This case, which was fatal, is tabulated among wounds of the genito-urinary organs.

One flesh wound of the shoulder proved fatal from hemorrhage from the axillary artery.

The shoulder joint was implicated in 9 cases, 1 fatal; the immediate cause of death not stated.

Of 134 flesh wounds of the arm the patient in 1 case died after amputation at the shoulder joint for injury to the blood vessels. Thirty-two cases of fractured humerus, 3 fatal, were reported. The deaths were due to septic infection after amputation of the arm in 1 case and to axillary hemorrhage in 2 cases, in 1 of which amputation at the shoulder joint was performed for traumatic aneurism and advancing gangrene. Besides this amputation at the shoulder 3 amputations of the arm were performed, 1 of which was fatal from septicæmia, as above stated. A resection of the humerus was performed in one case, and the bullet and fragments of bone were removed in several cases.

In 10 cases in which the elbow joint was injured the only operation recorded was the removal of the bullet and wiring of the fragments of bone in 1 case.

Death from tetanus is recorded in 1 case of flesh wound of the forearm.

In 37 cases of fractured forearm amputation was performed in 2 cases, bullets removed in 2 cases, and pieces of bone removed in 2 cases.

In 21 cases of fractured carpus and metacarpus operations were recorded in 10 cases—in 1 case, which ended fatally, amputation at the shoulder joint for gangrene; in 2 cases, extraction of the bullet; in 1, removal of necrosed bone; in 1, excision of metacarpal bones, and in 5 cases, amputation of the fingers or of the fingers and part of the metacarpal bones.

In 105 cases of fracture of the fingers, 54 amputations were performed.

The hip joint was reported injured only in 1 case; pieces of bone were removed, and the patient on recovery was discharged as unfit for further military duty.

In 362 flesh wounds of the thigh 7 cases ended fatally—1 from septic infection; 1 from gangrene; 2 from hemorrhage, in 1 of which the femoral artery was ligated; 1 is said to have died in the operating room, while in 2 cases no reference is made to the immediate cause of death. The bullet was discovered by the X-rays and removed in 1 case; the femoral artery was ligated in 2 cases, the patient recovering in 1 case, a Mauser wound, and dying in the other, a Remington wound; the leg was amputated in 1 case for gangrene, resulting from injury to the popliteal artery, and the thigh in another also for gangrene, both ending favorably.

Seventeen fractures of the femur in its upper third were recorded, with 3 deaths. The only surgical work reported in connection with these fractures is the removal of the bullet in 3 cases.

Seventeen fractures of the femur in its middle third were recorded, with 2 deaths (1 of the latter having occurred in 1900). The bullet was removed in 1 case and necrosed bone in 1 case; resection was performed in 1 case and amputation (in 1900) in 1 case, which was fatal.

Nine fractures of the lower third of the femur, none fatal, were

ecorded. The bullet was extracted in 1 case; dead bone was removed nd sinuses curetted in 1 case.

In 24 injuries implicating the knee joint, 1 proved fatal, death having ccurred in 1900 after amputation of the thigh. The missile was moved in 4 cases and amputation was performed in 1 case, the patient ecovering.

In 186 flesh wounds of the leg 1 death was reported from shock llowing operation for severed tibial artery. In 1 case the missile as discovered by the X-rays and removed, and in 1 case the external opliteal nerve was resected.

The bones of the leg were fractured in 54 cases, 5 fatal. Death sulted from tetanus in 1 case, septic infection in 2 cases; in 1 case the atient is recorded as having died from the effects of wounds received action, and in 1 case no reference is made to the immediate cause of ath. The surgical work reported consisted of the removal of the llet in 1 case, of the bullet and spiculæ of bone in 1 case, of scales of ad in 1 case, and of the bullet and necrosed bone in 1 case. Formal placement of fragments is reported in 2 cases and amputation in 4 ses.

One death from tetanus occurred in 120 cases of flesh wound of the ot.

The surgical work on the injuries of the ankle and foot consisted of e removal of bullets, fragments of bone, and of necrosed bone, with mputation of the foot in 2 cases and of the toes in 4 cases.

The following tabulations present the statistical details of the 2,276 nshot wounds reported from the Regular and Volunteer armies dur- g the year 1899. They consist of five sets, in the following order:

I.—Regulars and volunteers:
  (*a*) All gunshot wounds.
  (*b*) Gunshot wounds received in action.
  (*c*) Gunshot wounds other than battle wounds.
II.—Regulars:
  (*a*) All gunshot wounds.
  (*b*) Gunshot wounds received in action.
  (*c*) Gunshot wounds other than battle wounds.
III.—Volunteers:
  (*a*) All gunshot wounds.
  (*b*) Gunshot wounds received in action.
  (*c*) Gunshot wounds other than battle wounds.
IV.—Gunshot wounds which terminated fatally in:
  (*a*) Regulars and volunteers.
  (*b*) Regulars.
  (*c*) Volunteers.
V.—Surgical operations for gunshot wounds.
  Regulars and volunteers.

I.—REGULAR AND VOLUNTEER ARMIES, 1899.

(*a*) *All gunshot wounds.*

Character and location of wound.	How received.						Nature of missile.														Disposition.							
		Not in action.																										
	In action.	In line of duty.	Not in line of duty.	Suicidal.	Homicidal.	Total.	Mauser.	Remington.	Krag-Jörgensen.	Bullets, other.	Jacket of bullet.	Cartridge shell.	Revolver.	Small shot.	Shell.	Canister.	Shrapnel.	Splinter.	Explosion of gun.	Explosion of cartridge.	Explosion of primer.	Total.	Duty.	Certificates of disability.	Died.	Discharged by order.	Expiration of service and muster out.	Death, other causes.	Remaining last report.	Total.
Head:																													
Flesh	84	3	1	....	....	88	33	11	....	38	1	....	1	....	1	....	....	1	2	....	....	88	84	....	....	2	2	....	....	88
Fracture	25	2	....	1	1	29	14	6	....	7	....	....	1	....	1	....	....	....	....	....	....	29	5	4	15	2	1	1	1	29
Face:																													
Flesh	44	7	2	....	....	53	18	8	....	20	....	....	2	....	2	....	....	....	1	2	....	53	45	2	....	5	1	....	....	53
Fracture	24	1	2	....	....	27	13	6	....	7	....	....	1	....	....	....	....	....	....	....	....	27	7	8	2	5	4	1	....	27
Neck	51	6	3	....	....	60	29	11	2	17	....	....	1	....	....	....	....	....	....	....	....	60	41	3	12	2	2	....	....	60
Spine, fracture	8	1	2	....	....	11	3	3	1	4	....	....	....	....	....	....	....	....	....	....	....	11	....	2	8	....	1	....	....	11
Thorax:																													
Nonpenetrating	61	19	4	....	....	84	24	22	2	29	....	....	5	....	....	....	....	1	1	....	....	84	74	1	1	3	3	....	2	84
Penetrating	95	10	4	3	1	113	48	32	4	27	....	....	2	....	....	....	....	....	....	....	....	113	49	13	36	11	3	....	1	113
Abdomen:																													
Nonpenetrating	33	3	2	....	....	38	15	5	....	16	....	....	2	....	....	....	....	....	....	....	....	38	37	1	....	....	....	....	....	38
Penetrating	49	8	2	....	1	60	31	9	2	14	....	....	4	....	....	....	....	....	....	....	....	60	10	4	41	1	3	....	1	60
Pelvis, fracture	4	....	....	....	....	4	1	....	....	3	....	....	....	....	....	....	....	....	....	....	....	4	2	....	2	....	....	....	....	4
Back and hip, flesh	74	4	....	....	....	78	34	25	1	13	....	....	2	....	3	....	....	....	....	....	....	78	63	5	....	8	1	1	....	78
Perineum, genital and urinary organs	12	1	1	....	....	14	3	4	....	5	....	....	2	....	....	....	....	....	....	....	....	14	10	....	3	....	1	....	....	14
Shoulder:																													
Flesh	97	10	4	....	....	111	44	28	1	34	....	....	1	....	1	....	1	....	1	....	....	111	91	4	1	9	5	1	....	111
Fracture clavicle or scapula	3	....	....	....	....	3	....	1	....	2	....	....	....	....	....	....	....	....	....	....	....	3	2	....	....	1	....	....	....	3
Joint	8	1	....	....	....	9	3	4	1	1	....	....	....	....	....	....	....	....	....	....	....	9	4	3	1	....	1	....	....	9
Arm:																													
Flesh	121	9	4	....	....	134	65	24	1	40	....	....	3	....	....	....	....	1	....	....	....	134	115	5	1	9	4	....	....	134
Fracture	27	4	....	1	....	32	16	10	3	1	....	....	2	....	....	....	....	....	....	....	....	32	13	10	3	4	2	....	....	32
Elbow joint	8	2	....	....	....	10	4	4	....	2	....	....	....	....	....	....	....	....	....	....	....	10	3	5	....	1	1	....	....	10
Forearm:																													
Flesh	115	15	2	....	....	132	59	27	3	38	....	....	3	....	1	....	....	1	....	....	....	132	123	4	1	4	....	....	....	132
Fracture	29	5	3	....	....	37	7	15	1	11	....	....	1	....	....	....	1	....	....	1	....	37	23	8	....	4	2	....	....	37
Wrist joint	2	....	....	....	....	2	....	....	1	1	....	....	....	....	....	....	....	....	....	....	....	2	1	1	....	....	....	....	....	2

Carpus and metacarpus, fracture	8	10	3	.....	21	2	3	6	7	.....	.....	2	1	.....	.....	.....	.....	.....	.....	21	10	3	4	.....	.....	.....	.....	.....	.....	21
Fingers, fracture	15	76	14	.....	105	5	5	31	52	.....	.....	11	1	.....	.....	.....	.....	.....	.....	105	82	19	.....	4	.....	.....	.....	.....	.....	105
Hip joint	1	.....	.....	.....	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1	.....	.....	.....	.....	.....	.....	.....	1
Thigh:																														
Flesh	321	31	10	.....	362	151	104	6	86	.....	.....	10	.....	4	.....	1	.....	.....	.....	362	294	20	7	22	15	.....	4	.....	.....	362
Fracture upper third	15	2	.....	.....	17	9	6	1	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	17	5	2	3	5	2	.....	.....	.....	.....	17
Fracture middle third	16	.....	1	.....	17	12	2	.....	2	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	17	4	5	2	3	2	.....	1	.....	.....	17
Fracture lower third	9	.....	.....	.....	9	5	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9	2	5	.....	1	.....	.....	1	.....	.....	9
Kneejoint	22	2	.....	.....	24	10	7	1	6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	24	8	8	1	4	3	.....	.....	.....	.....	24
Leg:																														
Flesh	145	35	6	.....	186	82	29	7	57	.....	.....	10	.....	1	.....	.....	.....	.....	.....	186	163	8	1	6	8	.....	.....	.....	.....	186
Fracture	44	7	3	.....	54	20	19	3	8	.....	.....	2	.....	2	.....	.....	.....	.....	.....	54	26	12	5	6	5	.....	.....	.....	.....	54
Ankle joint	5	1	.....	.....	6	1	2	1	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6	4	2	.....	.....	.....	.....	.....	.....	.....	6
Foot, flesh	65	49	6	.....	120	33	11	27	40	.....	.....	9	.....	.....	.....	.....	.....	.....	.....	120	100	5	1	8	3	.....	3	.....	.....	120
Tarsus and metatarsus, fracture	15	14	1	.....	30	7	5	7	10	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	30	24	4	.....	.....	1	.....	1	.....	.....	30
Toes, fracture	7	13	.....	.....	20	6	.....	5	8	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	20	18	.....	.....	1	1	.....	.....	.....	.....	20
Unknown	4	3	1	.....	8	2	.....	.....	5	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	8	7	.....	1	.....	.....	.....	.....	.....	.....	8
Total	1,759	411	98	5	3	2,276	851	471	131	682	1	1	98	2	16	1	3	2	10	6	1	2,276	1,714	180	149	134	80	4	[1]15	2,276

[1] On December 31, 1899, there remained on sick report 216 cases, but since that date 134 cases have been returned to duty, 61 discharged on certificates of disability, 1 discharged by order, 2 by expiration of term of service, and 3 died. The cases fatal in 1900 comprised 1 case of kneejoint injury, 1 of the 2 fatal cases of fracture of the middle third of the femur, and 1 of the 15 fatal cases of fracture of the cranium.

(*b*) *Gunshot wounds received in action.*

Character and location of wound.	Nature of missile.												Disposition.							
	Mauser.	Remington.	Krag-Jörgensen.	Bullets, other.	Jacket of bullet.	Cartridge shell.	Shell.	Canister.	Shrapnel.	Splinters.	Explosion of gun.	Explosion of primer.	Total.	Duty.	Certificates of disability.	Died.	Discharged by order.	Expiration of service and muster out.	Death, other causes.	Remaining last report.	Total.
Head:																					
Flesh	33	11	....	35	1	....	1	....	....	1	2	....	84	80	....	....	2	2	....	....	84
Fracture	14	6	....	4	....	....	1	....	....	....	....	....	25	5	4	11	2	1	1	1	25
Face:																					
Flesh	17	6	....	19	....	....	1	....	....	....	1	....	44	37	1	....	5	1	....	....	44
Fracture	13	6	....	5	....	....	....	....	....	....	....	....	24	5	7	2	5	4	1	....	24
Neck	29	11	....	11	....	....	....	....	....	....	....	....	51	36	3	9	2	1	....	....	51
Spine, fracture	3	3	1	1	....	....	....	....	....	....	....	....	8	....	2	5	....	1	....	....	8
Thorax:																					
Nonpenetrating	20	21	....	19	....	....	....	....	....	....	1	....	61	52	1	1	3	3	....	1	61
Penetrating	48	32	....	15	....	....	....	....	....	....	....	....	95	41	12	28	11	2	....	1	95
Abdomen:																					
Nonpenetrating	14	5	....	14	....	....	....	....	....	....	....	....	33	32	1	....	....	....	....	....	33
Penetrating	31	8	....	10	....	....	....	....	....	....	....	....	49	10	3	31	1	3	....	1	49
Pelvis, fracture	1	....	....	3	....	....	....	....	....	....	....	....	4	2	....	2	....	....	....	....	4
Back and hip, flesh	33	24	1	13	....	....	3	....	....	....	....	....	74	60	5	....	7	1	1	....	74
Perineum, genital and urinary organs	3	4	....	5	....	....	....	....	....	....	....	....	12	8	....	3	....	1	....	....	12
Shoulder:																					
Flesh	40	26	....	28	....	....	1	....	1	....	1	....	97	78	4	1	9	4	1	....	97
Fracture clavicle and scapula	....	1	....	2	....	....	....	....	....	....	....	....	3	2	....	....	1	....	....	....	
Joint	3	4	....	1	....	....	....	....	....	....	....	....	8	3	3	1	....	1	....	....	8
Arm:																					
Flesh	61	23	1	35	....	....	....	....	....	1	....	....	121	103	4	1	9	4	....	....	121
Fracture	16	10	....	1	....	....	....	....	....	....	....	....	27	12	6	3	4	2	....	....	27
Elbow joint	4	4	....	....	....	....	....	....	....	....	....	....	8	3	4	....	1	....	....	....	8
Forearm:																					
Flesh	57	25	....	31	....	....	1	....	....	....	1	....	115	108	3	....	2	....	....	....	115
Fracture	7	15	....	6	....	....	....	....	1	....	....	....	29	17	6	....	4	2	....	....	29
Hand, flesh	41	16	2	32	....	1	....	....	....	....	2	1	95	89	1	....	4	3	....	....	95
Carpus and metacarpus, fracture	2	3	....	3	....	....	....	....	....	....	....	....	8	6	2	....	....	....	....	....	8

Hip joint		1										1		1							1
Thigh:																					
Flesh	151	101	2	64			3					321	260	19	6	20	13		3	321	
Fracture upper third	9	6										15	5		3	5	2			15	
Fracture middle third	12	2		1				1				16	4	5	2	3	1		1	16	
Fracture lower third	5	4										9	2	5		1			1	9	
Kneejoint	10	7		5								22	6	8	1	1	3			22	
Leg:																					
Flesh	77	29	1	38								145	128	6	1	5	5			145	
Fracture	20	19		3			2					44	18	11	5	5	5			44	
Ankle joint	1	2		2								5	3	2						5	
Foot, flesh	32	11	1	21								65	56	3		3	2		1	65	
Tarsus and metatarsus, fracture	7	4		4								15	12	3						15	
Toes, fracture	6			1								7	6			1				7	
Unknown	2			2								4	4							4	
Total	826	455	9	440	1	1	13	1	2	2	8	1	1,759	1,307	136	116	119	67	1	[1]10	1,759

[1] On December 31, 1899, there remained on sick report 106 cases, but since that date 87 cases have been returned to duty, 14 discharged for disability, 2 discharged by expiration of term of service, and 3 died. The deaths include 1 of the 11 cases of cranial fracture, 1 of the 2 fatal cases of fractured femur in its middle third, and 1 of kneejoint injury.

I.—REGULAR AND VOLUNTEER ARMIES, 1899.

(*c*) *Gunshot wounds other than battle wounds.*

Character and location of wound.	How received.					Nature of missile.									Disposition.						
	In line of duty.	Not in line of duty.	Suicidal.	Homicidal.	Total.	Mauser.	Remington.	Krag-Jörgensen.	Bullets, other.	Revolver.	Small shot.	Shell.	Shrapnel.	Explosion of cartridge.	Explosion of gun.	Total.	Duty.	Certificates of disability.	Died.	Discharged by order.	Expiration of service and muster out.	Remaining last report.	Total.
Head:																							
Flesh	3	1			4				3	1						4	4						4
Fracture	2		1	1	4				3	1						4			4				4
Face:																							
Flesh	7	2			9	1	2		1	2		1		2		9	8	1					9
Fracture	1	2			3				2	1						3	2	1					3
Neck	6	3			9			2	6	1						9	5		3		1		9
Spine, fracture	1	2			3				3							3			3				3
Thorax:																							
Nonpenetrating	19	4			23	4	1	2	10	5				1		23	22					1	23
Penetrating	10	4	3	1	18			4	12	2						18	8	1	8		1		18
Abdomen:																							
Nonpenetrating	3	2			5	1			2	2						5	5						5
Penetrating	8	2		1	11		1	2	4	4						11		1	10				11
Back and hip, flesh	4				4	1	1			2						4	3			1			5
Perineum, genital and urinary organs	1	1			2					2						2	2						2
Shoulder:																							
Flesh	10	4			14	4	2	1	6	1						14	13				1		14
Joint	1				1			1								1	1						1
Arm:																							
Flesh	9	4			13	4	1		5	3						13	12	1					13
Fracture	4		1		5			3		2						5	1	4					5
Elbow joint	2				2				2							2		1			1		2
Forearm:																							
Flesh	15	2			17	2	2	3	7	3						17	15	1	1				17
Fracture	5	3			8			1	5	1				1		8	6	2					8
Wrist joint	2				2			1	1							2	1	1					2
Hand, flesh	55	17			72	1	2	11	37	17				2	2	72	70	1		1			72
Carpus and metacarpus, fracture	10	3			13			6	4	2	1					13	10	2	1				13

Fingers, fracture	76	14	....	....	90	1	....	31	46	11	1	....	....	....	....	90	68	18	....	4	....	....	90
Thigh:																							
Flesh	31	10	....	....	41	....	3	4	22	10	....	1	1	....	....	41	34	1	1	2	2	1	41
Fracture upper third	2	....	....	....	2	....	....	1	....	1	....	....	....	....	....	2	....	2	....	....	....	....	2
Fracture middle third	....	1	....	....	1	....	....	....	1	....	....	....	....	....	....	1	....	....	....	....	1	....	1
Kneejoint	2	....	....	....	2	....	....	1	1	....	....	....	....	....	....	2	2	....	....	....	....	....	2
Leg:																							
Flesh	35	6	....	....	41	5	....	6	19	10	....	1	....	....	....	41	35	2	....	1	3	....	41
Fracture	7	3	....	....	10	....	....	3	5	2	....	....	....	....	....	10	8	1	....	1	....	....	10
Ankle joint	1	....	....	....	1	....	....	1	....	....	....	....	....	....	....	1	1	....	....	....	....	....	1
Foot, flesh	49	6	....	....	55	1	....	26	19	9	....	....	....	....	....	55	44	2	1	5	1	2	55
Tarsus and metatarsus, fracture	14	1	....	....	15	....	1	7	6	1	....	....	....	....	....	15	12	1	....	....	1	1	15
Toes, fracture	13	....	....	....	13	....	....	5	7	1	....	....	....	....	....	13	12	....	....	....	1	....	13
Unknown	3	1	....	....	4	....	....	....	3	1	....	....	....	....	....	4	3	....	1	....	....	....	4
Total	411	98	5	3	517	25	16	122	242	98	2	3	1	6	2	517	407	44	33	15	13	15	517

[1] On December 31, 1899, there remained on sick report 70 cases, but since that date 47 cases have been returned to duty, 17 discharged for disability, and 1 discharged by order.

9877—00—20

II.—REGULAR ARMY, 1899.

(a) *All gunshot wounds.*

Character and location of wound.	How received.						Nature of missile.													Disposition.						
	In action.	Not in action.					Mauser.	Remington.	Krag-Jörgensen.	Bullets, other.	Jacket of bullet.	Cartridge shell.	Revolver.	Small shot.	Shell.	Canister.	Shrapnel.	Splinter.	Explosion of cartridge.	Explosion of primer.		Duty.	Certificates of disability.	Died.	Discharged by order.	Expiration of service.	Death, other causes.	Remaining last report.	
		In line of duty.	Not in line of duty.	Suicidal.	Homicidal.	Total.															Total.							Total.
Head:																												
Flesh	37	1	....	....	....	38	17	8	....	11	1	....	....	....	1	....	....	....	....	....	38	38	....	....	....	....	....	....	38
Fracture	10	....	....	....	1	11	6	3	....	....	....	....	1	....	1	....	....	....	....	....	11	3	3	4	....	....	1	....	11
Face:																												
Flesh	15	5	2	....	....	22	7	4	....	7	....	....	2	....	1	....	....	....	1	....	22	21	....	....	1	....	....	....	22
Fracture	8	1	2	....	....	11	4	3	....	3	....	....	1	....	....	....	....	....	....	....	11	3	5	2	....	....	1	....	11
Neck	16	1	3	....	....	20	11	3	1	5	....	....	....	....	....	....	....	....	....	....	20	14	3	3	....	....	....	....	20
Spine, fracture	5	1	2	....	....	8	2	2	1	3	....	....	....	....	....	....	....	....	....	....	8	....	1	7	....	....	....	....	8
Thorax:																												
Nonpenetrating	23	8	3	....	....	34	13	10	1	6	....	....	4	....	....	....	....	....	....	....	34	32	1	....	....	....	....	1	34
Penetrating	34	5	3	3	1	46	15	15	4	10	....	....	2	....	....	....	....	....	....	....	46	23	8	13	1	....	....	1	46
Abdomen:																												
Nonpenetrating	9	....	....	....	....	9	6	1	....	2	....	....	....	....	....	....	....	....	....	....	9	8	1	....	....	....	....	....	9
Penetrating	18	3	1	....	1	23	13	4	2	3	....	....	1	....	....	....	....	....	....	....	23	4	4	11	1	....	....	....	23
Pelvis, fracture	3	....	....	....	....	3	1	....	....	2	....	....	....	....	....	....	....	....	....	....	3	2	....	1	....	....	....	....	3
Back and hip, flesh	25	2	....	....	....	27	10	11	1	1	....	....	1	....	3	....	....	....	....	....	27	24	3	....	....	....	....	....	27
Perineum, genital and urinary organs	5	1	1	....	....	7	3	1	....	1	....	....	2	....	....	....	....	....	....	....	7	7	....	....	....	....	....	....	7
Shoulder:																												
Flesh	29	4	4	....	....	37	13	11	....	11	....	....	1	....	1	....	....	....	....	....	37	33	2	....	1	....	1	....	37
Joint	5	1	....	....	....	6	3	2	1	....	....	....	....	....	....	....	....	....	....	....	6	4	2	....	....	....	....	....	6
Arm:																												
Flesh	45	3	3	....	....	51	23	12	1	12	....	....	2	....	....	....	....	1	....	....	51	44	5	1	....	1	....	....	51
Fracture	13	3	....	1	....	17	11	2	3	....	....	....	1	....	....	....	....	....	....	....	17	9	8	....	....	....	....	....	17
Elbow joint	6	1	....	....	....	7	3	3	....	1	....	....	....	....	....	....	....	....	....	....	7	3	4	....	....	....	....	....	7
Forearm:																												
Flesh	53	10	2	....	....	65	31	14	3	14	....	....	2	....	1	....	....	....	....	....	65	62	2	1	....	....	....	....	65
Fracture	11	2	3	....	....	16	3	6	1	4	....	....	1	....	....	....	....	....	1	....	16	10	5	....	1	....	....	....	16
Wrist joint	....	1	....	....	....	1	....	....	1	....	....	....	....	....	....	....	....	....	....	....	1	....	1	....	....	....	....	....	1
Hand, flesh	35	29	12	....	....	76	21	9	10	21	....	1	13	....	....	....	....	....	....	1	76	73	1	....	1	1	....	....	76
Carpus and metacarpus, fracture	5	7	3	....	....	15	1	3	5	4	....	....	1	1	....	....	....	....	....	....	15	11	3	1	....	....	....	....	15
Fingers, fracture	12	50	11	....	....	73	4	3	25	33	....	....	7	1	....	....	....	....	....	....	73	60	13	....	....	....	....	....	73

Thigh:																													
Flesh	132	15	4	...	...	151	72	40	4	27	...	...	5	...	2	...	1	...	...	...	151	128	13	4	3	...	...	3	151
Fracture upper third	3	2	...	...	...	5	1	2	1	...	...	...	1	...	...	...	...	...	...	...	5	2	2	1	...	...	...	...	5
Fracture middle third	9	...	...	...	...	9	6	2	...	...	...	...	...	...	...	1	...	...	...	...	9	2	5	1	1	...	...	...	9
Fracture lower third	7	...	...	...	...	7	3	4	...	...	...	...	...	...	...	...	...	...	...	...	7	2	4	...	...	...	...	1	7
Kneejoint	7	1	...	...	...	8	3	3	1	1	...	...	...	...	...	...	...	...	...	...	8	2	5	1	...	...	...	...	8
Leg:																													
Flesh	64	17	2	...	...	83	37	15	6	17	...	...	8	...	...	...	...	...	...	...	83	75	6	...	1	1	...	...	83
Fracture	24	6	2	...	...	32	13	8	2	6	...	...	2	...	1	...	...	...	...	...	32	18	8	1	2	...	...	...	32
Ankle joint	4	...	...	...	...	4	1	2	...	1	...	...	...	...	...	...	...	...	...	...	4	2	2	...	...	...	...	...	4
Foot, flesh	25	33	1	...	...	59	11	7	21	17	...	...	3	...	...	...	...	...	...	...	59	47	5	1	4	...	...	2	59
Tarsus and metatarsus, fracture	7	10	...	...	...	17	4	2	6	4	...	...	1	...	...	...	...	...	...	...	17	13	3	...	...	...	...	1	17
Toes, fracture	6	8	...	...	...	14	6	...	5	2	...	...	1	...	...	...	...	...	...	...	14	13	...	...	1	...	...	...	14
Unknown	1	1	1	...	...	3	1	...	...	1	...	...	1	...	...	...	...	...	...	...	3	3	...	...	...	...	...	...	3
Total	712	232	65	4	3	1,016	379	216	106	230	1	1	64	2	11	1	1	1	2	1	1,016	795	129	59	18	3	3	19	1,016

[1] On December 31, 1899, there remained on sick report 150 cases, but since that date 85 cases have been returned to duty, 52 discharged for disability, 1 discharged by order and 2 by expiration of term of service, and 1 died. The fatal case was one of injury to the kneejoint.

II.—REGULAR ARMY, 1899.

(*b*) *Gunshot wounds received in action.*

Character and location of wound.	Nature of missile.											Disposition.							
	Mauser.	Remington.	Krag-Jörgensen.	Bullets, other.	Jacket of bullet.	Cartridge shell.	Shell.	Canister.	Splinters.	Explosion of primer.	Total.	Duty.	Certificate of disability.	Died.	Discharged by order.	Expiration of service.	Death, other causes.	Remaining last report.	Total.
Head:																			
Flesh	17	8	.....	10	1	.....	1	.....	.....	.....	37	37	.....	.....	.....	.....	.....	.....	37
Fracture	6	3	.....	.....	.....	.....	1	.....	.....	.....	10	3	3	3	.....	.....	1	.....	10
Face:																			
Flesh	6	3	.....	6	.....	.....	.....	.....	.....	.....	15	14	.....	.....	1	.....	.....	.....	15
Fracture	4	3	.....	1	.....	.....	.....	.....	.....	.....	8	1	4	2	.....	.....	1	.....	8
Neck	11	3	.....	2	.....	.....	.....	.....	.....	.....	16	12	3	1	.....	.....	.....	.....	16
Spine, fracture	2	2	1	.....	.....	.....	.....	.....	.....	.....	5	.....	1	4	.....	.....	.....	.....	5
Thorax:																			
Nonpenetrating	10	9	.....	4	.....	.....	.....	.....	.....	.....	23	21	1	.....	.....	.....	.....	1	23
Penetrating	15	15	.....	4	.....	.....	.....	.....	.....	.....	34	17	7	8	1	.....	.....	1	34
Abdomen:																			
Nonpenetrating	6	1	.....	2	.....	.....	.....	.....	.....	.....	9	8	1	.....	.....	.....	.....	.....	9
Penetrating	13	3	.....	2	.....	.....	.....	.....	.....	.....	18	4	3	10	1	.....	.....	.....	18
Pelvis, fracture	1	.....	.....	2	.....	.....	.....	.....	.....	.....	3	2	.....	1	.....	.....	.....	.....	3
Back and hip, flesh	10	10	1	1	.....	.....	3	.....	.....	.....	25	22	3	.....	.....	.....	.....	.....	25
Perineum, genital and urinary organs	3	1	.....	1	.....	.....	.....	.....	.....	.....	5	5	.....	.....	.....	.....	.....	.....	5
Shoulder:																			
Flesh	11	10	.....	7	.....	.....	1	.....	.....	.....	29	25	2	.....	1	.....	1	.....	29
Joint	3	2	.....	.....	.....	.....	.....	.....	.....	.....	5	3	2	.....	.....	.....	.....	.....	5
Arm:																			
Flesh	23	11	1	9	.....	.....	.....	.....	1	.....	45	39	4	1	.....	1	.....	.....	45
Fracture	11	2	.....	.....	.....	.....	.....	.....	.....	.....	13	8	5	.....	.....	.....	.....	.....	13
Elbow joint	3	3	.....	.....	.....	.....	.....	.....	.....	.....	6	3	3	.....	.....	.....	.....	.....	6
Forearm:																			
Flesh	30	13	.....	9	.....	.....	1	.....	.....	.....	53	52	1	.....	.....	.....	.....	.....	53
Fracture	3	6	.....	2	.....	.....	.....	.....	.....	.....	11	6	4	.....	1	.....	.....	.....	11
Wrist joint	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hand, flesh	20	7	1	5	.....	1	.....	.....	.....	1	35	34	.....	.....	.....	1	.....	.....	35
Carpus and metacarpus, fracture	1	3	.....	1	.....	.....	.....	.....	.....	.....	5	3	2	.....	.....	.....	.....	.....	5
Fingers, fracture	4	3	.....	5	.....	.....	.....	.....	.....	.....	12	12	.....	.....	.....	.....	.....	.....	12

Hip joint		1								1		1						1	
Thigh:																			
Flesh	72	40	1	17			2			132	110	15	4	3			2	132	
Fracture upper third	1	2								3	2		1					3	
Fracture middle third	6	2						1		9	2	5	1	1				9	
Fracture lower third	3	4								7	2	4					1	7	
Kneejoint	3	3		1						7	1	5	1					7	
Leg:																			
Flesh	37	15	1	11						64	58	4		1	1			64	
Fracture	13	8		2			1			24	12	7	4	1				24	
Ankle joint	1	2		1						4	2	2						4	
Foot, flesh	11	7	1	6						25	20	3		1			1	25	
Tarsus and metatarsus, fracture	4	1		2						7	2	5						7	
Toes, fracture	6									6	5			1				6	
Unknown	1									1	1							1	
Total	371	206	7	113	1	1	10	1	1	1	712	551	95	11	13	3	3	[1]6	712

[1] On December 31, 1899, there remained on sick report 100 cases, but since that date 52 cases were returned to duty, 39 discharged for disability, 2 discharged on account of expiration of term of service, and 1 died—the last a case of kneejoint injury.

(c) *Gunshot wounds other than battle wounds.*

Character and location of wound.	How received.					Nature of missile.									Disposition.					
	In line of duty.	Not in line of duty.	Suicidal.	Homicidal.	Total.	Mauser.	Remington.	Krag-Jörgensen.	Bullets, other.	Revolver.	Small shot.	Shell.	Shrapnel.	Explosion of cartridge.	Total.	Duty.	Certificates of disability.	Died.	Discharged by order.	Remaining last report.	Total.
Head:																					
Flesh	1				1				1						1	1					1
Fracture				1	1					1					1			1			1
Face:																					
Flesh	5	2			7	1	1		1	2		1		1	7	7					7
Fracture	1	2			3				2	1					3	2	1				3
Neck	1	3			4			1	3						4	2		2			4
Spine, fracture	1	2			3				3						3			3			3
Thorax:																					
Nonpenetrating	8	3			11	3	1	1	2	4					11	11					11
Penetrating	5	3	3	1	12			4	6	2					12	6	1	5			12
Abdomen:																					
Nonpenetrating																					
Penetrating	3	1		1	5		1	2	1	1					5		1	4			5
Pelvis, fracture																					
Back and hip, flesh	2				2		1			1					2	2					2
Perineum, genital and urinary organs	1	1			2					2					2	2					2
Shoulder:																					
Flesh	4	4			8	2	1		4	1					8	8					8
Fracture clavicle or scapula																					
Joint	1				1			1							1	1					1
Arm:																					
Flesh	3	3			6		1		3	2					6	5	1				6
Fracture	3		1		4			3		1					4	1	3				4
Elbow joint	1				1				1						1		1				1
Forearm:																					
Flesh	10	2			12	1	1	3	5	2					12	10	1	1			12
Fracture	2	3			5			1	2	1				1	5	4	1				5
Wrist joint	1				1			1							1		1				1
Hand, flesh	29	12			41	1	2	9	16	13					41	39	1		1		41
Carpus and metacarpus, fracture	7	3			10			5	3	1	1				10	8	1	1			10

Fingers, fracture	50	11			61			25	28	7	1				61	48	13				61
Thigh:																					
Flesh	15	4			19			3	10	5			1		19	18				1	19
Fracture upper third	2				2			1		1					2		2				2
Kneejoint	1				1			1							1	1					1
Leg:																					
Flesh	17	2			19			5	6	8					19	17	2				19
Fracture	6	2			8			2	4	2					8	6	1		1		8
Foot, flesh	33	1			34			20	11	3					34	27	2	1	3	1	34
Tarsus and metatarsus, fracture	10				10		1	6	2	1					10	8	1			1	10
Toes, fracture	8				8			5	2	1					8	8					8
Unknown	1	1			2				1	1					2	2					2
Total	232	65	4	3	304	8	10	99	117	64	2	1	1	2	304	244	34	18	5	13	304

[1] On December 31, 1899, there remained on sick report 50 cases, but since that date 33 cases have been returned to duty, 13 discharged for disability, and 1 by order.

III.—VOLUNTEER ARMY, 1899

(a) *All gunshot wounds.*

Character and location of wound.	How received.					Nature of missile.										Disposition.						
	In action.	Not in action.			Total.	Mauser.	Remington.	Krag-Jörgensen.	Bullets, other.	Revolver.	Shell.	Shrapnel.	Splinter.	Explosion of gun.	Explosion of cartridge.	Total.	Duty.	Certificates of disability.	Died.	Discharged by order.	Mustered out.	Death, other causes.	Remaining last report.	Total.
		In line of duty.	Not in line of duty.	Suicidal.																			
Head:																							
Flesh	47	2	1	....	50	16	3	....	27	1	....	....	1	2	....	50	46	....	....	2	2	....	....	50
Fracture	15	2	....	1	18	8	3	....	7	....	....	....	....	....	....	18	2	1	11	....	1	....	1	18
Face:																							
Flesh	29	2	....	....	31	11	4	....	13	....	1	....	....	1	1	31	24	3	....	1	1	....	....	31
Fracture	16	....	....	....	16	9	3	....	4	....	....	....	....	....	....	16	4	3	....	5	4	....	....	16
Neck	35	5	....	....	40	18	8	1	12	1	....	....	....	....	....	40	27	....	9	2	2	....	....	40
Spine, fracture	3	....	....	....	3	1	1	....	1	....	....	....	....	....	....	3	....	1	1	....	1	....	....	3
Thorax:																							
Nonpenetrating	38	11	1	....	50	11	12	1	23	1	....	....	....	1	1	50	42	....	1	3	3	....	1	50
Penetrating	61	5	1	....	67	33	17	....	17	....	....	....	....	....	....	67	26	5	23	10	3	....	....	67
Abdomen:																							
Nonpenetrating	24	3	2	....	29	9	4	....	14	2	....	....	....	....	....	29	29	....	....	....	....	....	....	29
Penetrating	31	5	1	....	37	18	5	....	11	3	....	....	....	....	....	37	6	....	27	....	3	....	1	37
Pelvis, fracture	1	....	....	....	1	....	....	....	1	....	....	....	....	....	....	1	....	....	1	....	....	....	....	1
Back and hip, flesh	49	2	....	....	51	24	14	....	12	1	....	....	....	....	....	51	39	2	....	8	1	1	....	51
Perineum, genital and urinary organs	7	....	....	....	7	....	3	....	4	....	....	....	....	....	....	7	3	....	3	....	1	....	....	7
Shoulder:																							
Flesh	68	6	....	....	74	31	17	1	23	....	....	1	....	1	....	74	58	2	1	8	5	....	....	74
Fracture clavicle or scapula	3	....	....	....	3	....	1	....	2	....	....	....	....	....	....	3	2	....	....	1	....	....	....	3
Joint	3	....	....	....	3	....	2	....	1	....	....	....	....	....	....	3	....	1	1	....	1	....	....	3
Arm:																							
Flesh	76	6	1	....	83	42	12	....	28	1	....	....	....	....	....	83	71	....	....	9	3	....	....	83
Fracture	14	1	....	....	15	5	8	....	1	1	....	....	....	....	....	15	4	2	3	4	2	....	....	15
Elbow joint	2	1	....	....	3	1	1	....	1	....	....	....	....	....	....	3	....	1	....	1	1	....	....	3
Forearm:																							
Flesh	62	5	....	....	67	28	13	....	24	1	....	....	....	1	....	67	61	2	....	4	....	....	....	67
Fracture	18	3	....	....	21	4	9	....	7	....	....	1	....	....	....	21	13	3	....	3	2	....	....	21
Wrist joint	1	....	....	....	1	....	....	....	1	....	....	....	....	....	....	1	1	....	....	....	....	....	....	1
Hand, flesh	60	26	5	....	91	21	9	3	48	4	....	....	....	4	2	91	86	1	....	2	2	....	....	91
Carpus and metacarpus, fracture	3	3	....	....	6	1	....	1	3	1	....	....	....	....	....	6	5	1	....	....	....	....	....	6

Fingers, fracture	3	26	3	....	32	1	2	6	19	4	....	....	....	....	....	32	22	6	....	4	....	....	....	....	32
Thigh:																									
Flesh	189	16	6	....	211	79	64	2	59	5	2	....	....	....	....	211	166	7	3	19	15	....	1	....	211
Fracture upper third	12	....	....	....	12	8	4	....	....	....	....	....	....	....	....	12	3	....	2	3	2	....	....	....	12
Fracture middle third	7	....	1	....	8	6	....	....	2	....	....	....	....	....	....	8	2	....	1	2	2	....	1	....	8
Fracture lower third	2	....	....	....	2	2	....	....	....	....	....	....	....	....	....	2	....	1	....	1	....	....	....	....	2
Kneejoint	15	1	....	....	16	7	4	....	5	....	....	....	....	....	....	16	6	3	....	4	3	....	....	....	16
Leg:																									
Flesh	81	18	4	....	103	45	14	1	10	2	1	....	....	....	....	103	88	2	1	3	7	....	....	....	103
Fracture	20	1	1	....	22	7	11	1	2	....	1	....	....	....	....	22	8	1	1	1	3	....	....	....	23
Ankle joint	1	1	....	....	2	....	....	1	1	....	....	....	....	....	....	2	2	....	....	....	....	....	....	....	2
Foot, flesh	10	16	5	....	61	22	4	6	23	6	....	....	....	....	....	61	53	....	....	4	3	....	1	....	61
Tarsus and metatarsus, fracture	8	4	1	....	13	3	3	1	6	....	....	....	....	....	....	13	11	1	....	....	1	....	....	....	13
Toes, fracture	1	5	....	....	6	....	....	....	6	....	....	....	....	....	....	6	5	....	....	....	1	....	....	....	6
Unknown	3	2	....	....	5	1	....	....	4	....	....	....	....	....	....	5	4	....	1	....	....	....	....	....	5
Total	1,047	179	33	1	1,260	472	255	25	452	34	5	2	1	10	4	1,260	919	51	90	116	77	1	16	....	1,260

[1] On December 31, 1899, there remained on sick report 66 cases, but since that date 49 cases have been returned to duty, 9 discharged on account of disability, and 2 have ended fatally. The deaths include 1 case of fracture of the middle third of the femur and 1 of the 11 fatal cases of fracture of the cranium.

(*b*) *Gunshot wounds received in action.*

Character and location of wound.	Nature of missile.								Disposition.							
	Mauser.	Remington.	Krag-Jörgensen.	Bullets, other.	Shell.	Shrapnel.	Splinters.	Explosion of gun.	Total.	Duty.	Certificates of disability.	Died.	Discharged by order.	Mustered out.	Death, other causes.	Remaining last report.	Total.
Head:																	
Flesh	16	3	....	25	....	.....	1	2	47	43	.....	.....	2	2	.....	.....	47
Fracture	8	3	....	4	....	.....	.....	.....	15	2	1	8	2	1	.....	1	15
Face:																	
Flesh	11	3	....	13	1	.....	.....	1	29	23	1	.....	4	1	.....	.....	29
Fracture	9	3	....	4	....	.....	.....	.....	16	4	3	.....	5	4	.....	.....	16
Neck	18	8	....	9	....	.....	.....	.....	35	24	.....	8	2	1	.....	.....	35
Spine, fracture	1	1	....	1	....	.....	.....	.....	3	.....	1	1	.....	1	.....	.....	3
Thorax:																	
Nonpenetrating	10	12	....	15	....	.....	.....	1	38	31	.....	1	3	3	.....	.....	38
Penetrating	33	17	....	11	....	.....	.....	.....	61	24	5	20	10	2	.....	.....	61
Abdomen:																	
Nonpenetrating	8	4	....	12	....	.....	.....	.....	24	24	.....	.....	.....	.....	.....	.....	24
Penetrating	18	5	....	8	....	.....	.....	.....	31	6	.....	21	.....	3	.....	1	31
Pelvis, fracture	.....	.....	....	1	....	.....	.....	.....	1	.....	.....	1	.....	.....	.....	.....	1
Back and hip, flesh	23	14	....	12	....	.....	.....	.....	49	38	2	.....	7	1	1	.....	49
Perineum, genital and urinary organs	.....	3	....	4	....	.....	.....	.....	7	3	.....	3	.....	1	.....	.....	7
Shoulder:																	
Flesh	29	16	....	21	....	1	.....	1	68	53	2	1	8	4	.....	.....	68
Fracture, clavicle and scapula	.....	1	....	2	....	.....	.....	.....	3	2	.....	.....	1	.....	.....	.....	3
Joint	.....	2	....	1	....	.....	.....	.....	3	.....	1	1	.....	1	.....	.....	3
Arm:																	
Flesh	38	12	....	26	....	.....	.....	.....	76	64	.....	.....	9	3	.....	.....	76
Fracture	5	8	....	1	....	.....	.....	.....	14	4	1	3	4	2	.....	.....	14
Elbow joint	1	1	....	.....	....	.....	.....	.....	2	.....	1	.....	1	.....	.....	.....	2
Forearm:																	
Flesh	27	12	....	22	....	.....	.....	1	62	56	2	.....	4	.....	.....	.....	62
Fracture	4	9	....	4	....	1	.....	.....	18	11	2	.....	3	2	.....	.....	18
Hand, flesh	21	9	1	27	....	.....	.....	2	60	55	1	.....	2	2	.....	.....	60
Carpus and metacarpus, fracture	1	.....	....	2	....	.....	.....	.....	3	3	.....	.....	.....	.....	.....	.....	3
Fingers, fracture	.....	2	....	1	....	.....	.....	.....	3	2	1	.....	.....	.....	.....	.....	3

| | | |

III.—VOLUNTEER ARMY, 1899.

(*c*) *Gunshot wounds other than battle wounds.*

Character and location of wound.	How received.				Nature of missile.								Disposition.						
	In line of duty.	Not in line of duty.	Suicidal.	Total.	Mauser.	Remington.	Krag-Jörgensen.	Bullets, other.	Revolver.	Shell.	Explosion of cartridge.	Explosion of gun.	Total.	Duty.	Certificates of disability.	Died.	Discharged by order.	Mustered out.	Remaining last report.	Total.
Head:																				
Flesh	2	1	....	3	....	....	....	2	1	....	....	....	3	3	....	....	....	....	....	3
Fracture	2	....	1	3	....	....	....	2	1	....	....	....	3	....	....	3	....	....	....	3
Face:																				
Flesh	2	....	....	2	....	1	....	....	....	....	1	....	2	1	1	....	....	....	....	2
Neck	5	....	....	5	....	....	1	3	1	....	....	....	5	3	....	1	....	1	....	5
Thorax:																				
Nonpenetrating	11	1	....	12	1	....	1	8	1	....	1	....	12	11	....	....	....	....	1	12
Penetrating	5	1	....	6	....	....	....	6	....	....	....	....	6	2	....	3	....	1	....	6
Abdomen:																				
Nonpenetrating	3	2	....	5	1	....	....	2	2	....	....	....	5	5	....	....	....	....	....	5
Penetrating	5	1	....	6	....	....	....	3	3	....	....	....	6	....	....	6	....	....	....	6
Back and hip, flesh	2	....	....	2	1	....	....	....	1	....	....	....	2	1	....	....	1	....	....	2
Shoulder:																				
Flesh	6	....	....	6	2	1	1	2	....	....	....	....	6	5	....	....	....	1	....	6
Arm:																				
Flesh	6	1	....	7	4	....	....	2	1	....	....	....	7	7	....	....	....	....	....	7
Fracture	1	....	....	1	....	....	....	....	1	....	....	....	1	....	1	....	....	....	....	1
Elbow joint	1	....	....	1	....	....	....	1	....	....	....	....	1	....	....	....	....	1	....	1
Forearm:																				
Flesh	5	....	....	5	1	1	....	2	1	....	....	....	5	5	....	....	....	....	....	5
Fracture	3	....	....	3	....	....	....	3	....	....	....	....	3	2	1	....	....	....	....	3
Wrist joint	1	....	....	1	....	....	....	1	....	....	....	....	1	1	....	....	....	....	....	1
Hand, flesh	26	5	....	31	....	....	2	21	4	....	2	2	31	31	....	....	....	....	....	31
Carpus and metacarpus, fracture	3	....	....	3	....	....	1	1	1	....	....	....	3	2	1	....	....	....	....	3
Fingers, fracture	26	3	....	29	1	....	6	18	4	....	....	....	29	20	5	....	4	....	....	29
Thigh:																				
Flesh	16	6	....	22	....	3	1	12	5	1	....	....	22	16	1	1	2	2	....	22
Fracture, middle third	....	1	....	1	....	....	....	1	....	....	....	....	1	....	....	....	....	1	....	1

Kneejoint	1			1				1					1	1								1
Leg:																						
Flesh	18	4		22	5		1	13	2	1			22	18			1	3				22
Fracture	1	1		2			1	1					2	2								2
Ankle joint	1			1			1						1	1								1
Foot, flesh	16	5		21	1		6	8	6				21	17			2	1	1			21
Tarsus and metatarsus, fracture	4	1		5			1	4					5	4				1				5
Toes, fracture	5			5				5					5	4				1				5
Unknown	2			2				2					2	1		1						2
Total	179	33	1	213	17	6	23	125	34	2	4	2	213	163	10	15	10	13	[1] 2			213

[1] On December 31, 1899, there remained on sick report 20 cases, but since that date 14 cases have been returned to duty and 4 discharged on certificates of disability.

IV.—GUNSHOT WOUNDS WHICH TERMINATED FATALLY.

(*a*) *Regular and Volunteer armies, 1899.*

Character and location of wound.	How received.						Nature of missile.								
		Not in action.					In action.						Not in action.		
	In action.	In line of duty.	Not in line of duty.	Suicide.	Homicide.	Total.	Mauser.	Remington.	Krag-Jörgensen.	Bullets, other.	Shell.	Canister.	Remington.	Krag-Jörgensen.	Bullets, other.	Revolver.
Head, fracture	10	2	....	1	1	14	5	3	....	2	....	....	....	....	3	1
Face, fracture	2	....	....	....	....	2	1	1	....	....	....	....	....	....	....	....
Neck	9	2	1	....	....	12	6	....	....	3	....	....	....	2	1	....
Spine, fracture	5	1	2	....	....	8	1	2	1	1	....	....	....	....	3	....
Thorax:																
Nonpenetrating	1	....	....	....	....	[1]1	1	....	....	....	....	....	....	....	....	....
Penetrating	28	5	1	1	1	36	10	12	....	6	....	....	....	1	5	[2]2
Abdomen, penetrating	31	7	2	....	1	41	19	6	....	6	....	....	1	1	3	[3]5
Pelvis, fracture	2	....	....	....	....	2	....	....	....	2	....	....	....	....	....	....
Perineum, genital and urinary organs	3	....	....	....	....	3	....	2	....	1	....	....	....	....	....	....
Shoulder:																
Flesh	1	....	....	....	....	[4]1	....	1	....	....	....	....	....	....	....	....
Joint	1	....	....	....	....	1	....	1	....	....	....	....	....	....	....	....
Arm:																
Flesh	1	....	....	....	....	[3]1	1	....	....	....	....	....	....	....	....	....
Fracture	3	....	....	....	....	[4]3	2	....	....	1	....	....	....	....	....	....
Forearm, flesh	....	1	....	....	....	[5]1	....	....	....	....	....	....	....	1	....	....
Carpus and metacarpus, fracture	....	....	1	....	....	[6]1	....	....	....	....	....	....	....	1	....	....
Thigh:																
Flesh	6	1	....	....	....	[7]7	2	3	....	1	....	....	....	....	1	....
Fracture, upper third	3	....	....	....	....	3	3	....	....	....	....	....	....	....	....	....
Fracture, middle third	1	....	....	....	....	1	....	....	....	....	....	1	....	....	....	....
Leg:																
Flesh	1	....	....	....	....	[8]1	1	....	....	....	....	....	....	....	....	....
Fracture	5	....	....	....	....	[9]5	1	3	....	....	1	....	....	....	....	....
Foot, flesh	....	1	....	....	....	[10]1	....	....	....	....	....	....	....	....	1	....
Unknown	....	1	....	....	....	1	....	....	....	....	....	....	....	....	1	....
Total	113	21	7	2	3	146	53	34	1	23	1	1	1	6	18	8

[1] Died after an operation for traumatic aneurism.
[2] Hemorrhage from axillary artery.
[3] Died after an amputation at shoulder for injury to blood vessels.
[4] Septicæmia in 1 case; hemorrhage in 2 cases.
[5] Tetanus.
[6] Death after amputation at the shoulder joint for gangrene.
[7] Septic infection in 1 case; gangrene in 1 case; hemorrhage in 2 cases; not stated in 3 cases.
[8] Shock after operation on posterior tibial artery.
[9] Septic infection in 2 cases; tetanus in 1 case; immediate cause of death not stated in 2 cases.
[10] Tetanus.

IV.—GUNSHOT WOUNDS WHICH TERMINATED FATALLY.

(*b*) *Regular Army, 1899.*

Character and location of wound.	How received.						Nature of missile.									
	Not in action.						In action.						Not in action.			
	In action.	In line of duty.	Not in line of duty.	Suicide.	Homicide.	Total.	Mauser.	Remington.	Krag-Jorgensen.	Bullets, other.	Shell.	Canister.	Remington.	Krag-Jorgensen.	Bullets, other.	Revolver.
Head, fracture	3	....	....	....	1	4	1	2	....	....	....	....	....	....	....	1
Face, fracture	2	....	....	....	....	2	1	1	....	....	....	....	....	....	....	....
Neck	1	1	1	....	....	3	1	....	....	....	....	....	....	1	1	....
Spine, fracture	4	1	2	....	....	7	1	2	1	....	....	....	....	....	3	....
Thorax, penetrating	8	3	....	1	1	13	3	5	....	....	....	....	....	1	2	2
Abdomen, penetrating	10	2	1	....	1	14	7	3	....	....	....	....	1	1	....	2
Pelvis, fracture	1	....	....	....	....	1	....	....	....	1	....	....	....	....	....	....
Arm, flesh	1	....	....	....	....	1	1	....	....	....	....	....	....	....	....	....
Forearm, flesh	....	1	....	....	....	1	....	....	....	....	....	....	....	1	....	....
Carpus and metacarpus, fracture	....	....	1	....	....	1	....	....	....	....	....	....	....	1	....	....
Thigh:																
Flesh	4	....	....	....	....	4	1	3	....	....	....	....	....	....	....	....
Fracture, upper third	1	....	....	....	....	1	1	....	....	....	....	....	....	....	....	....
Fracture, middle third	1	....	....	....	....	1	....	....	....	....	....	....	1	....	....	....
Leg, fracture	4	....	....	....	....	4	1	2	....	....	1	....	....	....	....	....
Foot, flesh	....	1	....	....	....	1	....	....	....	....	....	....	....	....	1	....
Total	40	9	5	1	3	58	18	18	1	1	1	1	1	5	7	5

(*c*) *Volunteer Army, 1899.*

Character and location of wound.	How received.					Nature of missile.					
	Not in action.					In action.			Not in action.		
	In action.	In line of duty.	Not in line of duty.	Suicide.	Total.	Mauser.	Remington.	Bullets, other.	Krag-Jorgensen.	Bullets, other.	Revolver.
Head, fracture	7	2	....	1	10	4	1	2	....	3	....
Neck	8	1	....	....	9	5	....	3	1	....	....
Spine, fracture	1	....	....	....	1	....	....	1	....	....	....
Thorax:											
Non-penetrating	1	....	....	....	1	1	....	....	....	....	....
Penetrating	20	2	1	....	23	7	7	6	....	3	....
Abdomen, penetrating	21	5	1	....	27	12	3	6	....	3	3
Pelvis, fracture	1	....	....	....	1	....	....	1	....	....	....
Perineum, genital, and urinary organs	3	....	....	....	3	....	2	1	....	....	....
Shoulder:											
Flesh	1	....	....	....	1	....	1	....	....	....	....
Joint	1	....	....	....	1	....	1	....	....	....	....
Arm, fracture	3	....	....	....	3	2	....	1	....	....	....
Thigh:											
Flesh	2	1	....	....	3	1	....	1	....	1	....
Fracture, upper third	2	....	....	....	2	2	....	....	....	....	....
Leg:											
Flesh	1	....	....	....	1	1	....	....	....	....	....
Fracture	1	....	....	....	1	....	1	....	....	....	....
Unknown	....	1	....	....	1	....	....	....	....	1	....
Total	73	12	2	1	88	35	16	22	1	11	3

V.—SURGICAL OPERATIONS FOR GUNSHOT WOUNDS.

Regulars and volunteers, 1899.

Character and location of wound.	Operation.	Result.		Nature of missile.								
		Recovered.	Died.	Mauser.	Remington.	Krag-Jörgensen.	Bullets, other.	Revolver.	Shotgun.	Shell.	Canister.	Explosion of cartridge.
Head, fracture	Bone removed from brain	....	1	1	....	....	....	....	....	....	....	....
Do	Depressed portion of skull removed	1	....	....	1	....	....	....	....	....	....	....
Do	Eye enucleated	1	....	1	....	....	....	....	....	....	....	....
Do	Wound closed by sutures	1	....	....	....	....	....	....	....	1	....	....
Face, flesh	Enucleation of eye	1	....	....	....	....	....	....	....	....	....	1
Face, fracture	do	1	....	1	....	....	....	....	....	....	....	....
Do	Bullet removed through floor of mouth	1	....	....	1	....	....	....	....	....	....	....
Do	Fragments of bone and portion of bullet removed	....	1	1	....	....	....	....	....	....	....	....
Neck	Bullet removed	2	....	1	1	....	....	....	....	....	....	....
Spine, fracture	do	1	1	1	1	....	....	....	....	....	....	....
Do	Laminectomy for extraction of bullet	....	1	....	....	....	1	....	....	....	....	....
Thorax, nonpenetrating	Operation for aneurism of axillary	....	1	1	....	....	....	....	....	....	....	....
Do	Subclavian artery ligated for aneurism	1	....	....	1	....	....	....	....	....	....	....
Thorax, penetrating	Ligation axillary artery	1	....	....	....	....	1	....	....	....	....	....
Do	Bullet removed	6	1	....	7	....	....	....	....	....	....	....
Do	Resection seventh rib	....	1	....	....	....	....	1	....	....	....	....
Abdomen, penetrating	Bullet removed	....	2	1	1	....	....	....	....	....	....	....
Do	Bullet located by X-ray in left iliac fossa.	1	....	1	....	....	....	....	....	....	....	....
Do	Laparotomy	1	4	4	1	....	....	....	....	....	....	....
Perineum, genital and urinary organs	Bladder sutured	....	1	....	....	....	1	....	....	....	....	....
Shoulder, fracture clavicle or scapula	Fragment of bullet removed	1	....	....	....	....	1	....	....	....	....	....
Shoulder joint	Bullet removed	1	....	....	1	....	....	....	....	....	....	....
Arm, flesh	Amputation at shoulder	....	1	1	....	....	....	....	....	....	....	....
Arm, fracture	Amputation	2	1	2	....	1	....	....	....	....	....	....
Do	Amputation at shoulder	....	1	1	....	....	....	....	....	....	....	....
Do	Bullet removed	1	....	1	....	....	....	....	....	....	....	....
Do	Bullet and fragments of bone removed	1	....	1	....	....	....	....	....	....	....	....
Do	Bullet removed and humerus resected	1	....	....	1	....	....	....	....	....	....	....
Do	Numerous small fragments removed through incision	1	....	1	....	....	....	....	....	....	....	....
Elbow joint	Bullet extracted and fragments wired	1	....	....	1	....	....	....	....	....	....	....
Forearm, fracture	Amputation	2	....	....	....	....	2	....	....	....	....	....
Do	Bullet removed	2	....	....	2	....	....	....	....	....	....	....
Do	Pieces of bone removed	2	....	....	....	....	2	....	....	....	....	....
Carpus and metacarpus, fracture	Bullet removed	2	....	....	....	....	1	1	....	....	....	....
Do	Amputation of fingers	3	....	1	1	....	1	....	....	....	....	....
Do	Amputation, finger and distal two-thirds of third metacarpal.	1	....	....	....	....	1	....	....	....	....	....
Do	Amputation, finger and resection second metacarpal.	1	....	....	....	....	1	....	....	....	....	....
Do	Excision third and fourth metacarpal	1	....	....	1	....	....	....	....	....	....	....
Do	Amputation at shoulder for gangrene	....	1	....	....	1	....	....	....	....	....	....
Do	Operation for necrosed bone	1	....	....	....	....	1	....	....	....	....	....
Fingers, fracture	Amputation	54	....	1	1	18	27	6	1	....	....	....
Hip joint	Pieces of bone removed	1	....	....	1	....	....	....	....	....	....	....
Thigh, flesh[1]	Bullet discovered by X-ray and removed.	1	....	....	1	....	....	....	....	....	....	....
Do	Ligation of femoral artery	1	1	1	1	....	....	....	....	....	....	....
Do	Amputation of leg[2]	1	....	....	1	....	....	....	....	....	....	....
Do	Amputation thigh for gangrene	1	....	1	....	....	....	....	....	....	....	....
Thigh, fracture, upper third	Bullet removed	3	....	....	3	....	....	....	....	....	....	....
Thigh, fracture, middle third	do	1	....	1	....	....	....	....	....	....	....	....
Do	Amputation	....	1	....	....	....	1	....	....	....	....	....
Do	Resection	....	1	....	....	....	....	....	....	....	1	....
Do	Fractured ends denuded of necrotic material and coapted; pus sinuses curetted.	1	....	....	....	....	1	....	....	....	....	....

[1] Ligation of the external iliac artery was performed in 1900 in the case of a flesh wound of the thigh received in 1899; gangrene subsequently necessitated a disarticulation at the hip joint, which was successful. See page 327.

[2] For gangrene resulting from injury to popliteal artery.

V.—SURGICAL OPERATIONS FOR GUNSHOT WOUNDS—Continued.

Regulars and volunteers, 1899—Continued.

Character and location of wound.	Operation.	Result.		Nature of missile.								
		Recovered.	Died.	Mauser.	Remington.	Krag-Jorgensen.	Bullets, other.	Revolver.	Shotgun.	Shell.	Canister.	Explosion of cartridge.
Thigh, fracture, lower third.	Bullet removed	1	....	1	....	....	....	....	....	....	....	....
Do	Sinuses curetted and dead bone removed.[1]	....	....	1	....	....	....	....	....	....	....	....
Knee joint	Bullet removed	4	....	1	2	....	1	....	....	....	....	....
Do	Amputation of thigh	1	....	....	....	....	1	....	....	....	....	....
Leg, flesh	Resection of external popliteal nerve	1	....	1	....	....	....	....	....	....	....	....
Do	Bullet discovered by X-ray and removed.	1	....	....	1	....	....	....	....	....	....	....
Do	Operation for severed tibial artery	....	1	1	....	....	....	....	....	....	....	....
Leg, fracture	Bullet removed	1	....	....	....	....	....	1	....	....	....	....
Do	Scales of lead removed	1	....	1	....	....	....	....	....	....	....	....
Do	Bullet and spiculæ of bone removed	1	....	....	....	1	....	....	....	....	....	....
Do	Trephining of bone; removal of bullet and necrosed parts.	1	....	....	....	....	1	....	....	....	....	....
Do	Splinters of bone removed	1	....	1	....	....	....	....	....	....	....	....
Do	Operation for comminuted fracture tibia. Ends of tibia freshened and periosteum of opposing segments sutured.	1	....	....	....	1	....	....	....	....	....	....
Do	Removal of detached bone fragments; plaster of paris splint with drainage through posterior exit.	1	....	1	....	....	....	....	....	....	....	....
Do	Amputation	4	....	....	2	1	1	....	....	....	....	....
Ankle joint	Bullet removed	1	....	....	....	....	1	....	....	....	....	....
Foot, flesh	Carious bone curetted[2]	....	....	....	....	1	....	....	....	....	....	....
Do	Operation for necrosis	1	....	....	....	1	....	....	....	....	....	....
Tarsus and metatarsus, fracture.	Amputation	2	....	....	....	1	1	....	....	....	....	....
Do	Bullet and fragment of bone removed.	1	....	....	....	....	1	....	....	....	....	....
Do	Bullet discovered by X-ray and removed.	1	....	1	....	....	....	....	....	....	....	....
Do	Splinters of bone removed	1	....	....	....	1	....	....	....	....	....	....
Do	Numerous fragments of bone removed[1]	....	....	....	....	1	....	....	....	....	....	....
Do	Necrosed spiculæ of bone removed	1	....	....	....	1	....	....	....	....	....	....
Toes, fracture	Amputation	4	....	1	....	....	3	....	....	....	....	....

[1] Remaining August 31, 1900. [2] Remaining July 31, 1900.

General remarks on the gunshot wounds of 1898 and 1899.—Of the 4,919 men injured by gunshot during the years 1898 and 1899, 586 were killed and 4,333 were wounded and received into the field and other hospitals. The killed constituted 11.9 per cent of those struck, the wounded 88.1 per cent. In other words, 1 man was killed for every 7.4 wounded. The Mauser bullet must therefore be regarded as less deadly than the larger missile used during the civil war. The Medical and Surgical History of the Civil War shows the following casualties:

	Killed.	Wounded.
United States troops	59,860	280,040
Confederate troops	51,425	227,871
Total	111,285	507,911

In percentages the casualties were: Killed, 17.97; wounded, 82.03; or 1 man killed to every 4.56 wounded. The relative proportion of killed was therefore consideraly larger during the civil war than

during our recent experiences. It is to be noted, also, that many of the wounds of the past two years were made by missiles of large caliber. Of those reported in 1899, 471 were specially stated as having been caused by the Remington bullet of caliber .45. It is safe to say that had the whole number of wounds received been inflicted by the smaller Mauser or Krag-Jörgensen bullet the percentage of immediately fatal wounds would have been materially lessened.

The less deadly character of the injuries inflicted by the modern bullet is manifested, also, when we exclude the killed and regard only those wounds which came under the care of the surgeons. Of these, during the two years, there were 4,333, and 259 of the patients, or 6 per cent of the whole number, died. The corresponding percentage from the records of the civil war was 14.3. Table C in Part I of the medical volume of the Medical and Surgical History of the War of the Rebellion shows that among the white troops of the Army there were borne on the reports of sick and wounded 230,018 gunshot wounds, of which 32,907, or 14.3 per cent, proved fatal. The marked reduction of the ratio of killed to wounded may be placed to the credit of the small-caliber bullet; but the lessened mortality among the cases which came into hospital may not wholly be attributed to the humane character of the wounds inflicted by this missile. Due credit must be given to the improved surgical methods of the present day. Wounds of any region of the body may be taken in comparison and the result will always be found to show a decided lessening in the percentage of cases ending fatally among those of the past two years as compared with those of the civil war. Take, for instance, gunshot wounds of the femur. During the civil war surgeons in the field hospitals regarded a fractured femur as a serious menace to life, the danger from which was believed to be materially lessened by an immediate amputation. The field hospital surgical work after a battle consisted in great part of amputations, excisions, and resections. Of 6,576 fractures of the femur 2,923 cases were treated by primary amputation, 186 by resection, and the remaining 3,467 by conservative or expectant measures, this conservative action being due in many of the cases to a want of favorable conditions for the performance of primary operations. The limb was promptly amputated in 44.4 per cent of these gunshot fractures. On the other hand, during the past two years, 82 cases of gunshot fracture of the femur were reported, 6 of which were treated by primary amputation and 2 by resection, the remaining 74 cases being treated by conservative methods, not because the conditions were not favorable for the performance of primary operations, but because of a conviction that under present methods of treatment the limb could be preserved without adding materially to the danger to life. The limb was lost through surgical intervention in only 7.3 per cent of the cases.

Not only limbs but lives were saved by the surgical practice of the past two years. In the 82 gunshot fractures of the femur the upper third was involved in 32, of which 5 were fatal; the middle third in 27, of which 3 were fatal; and the lower third in 23, of which 1 was fatal. The mortality varied from 4.3 per cent of the cases in which the lower third was fractured to 15.6 per cent of the cases in which the upper third was the site of the injury, whereas the corresponding percentages of fatal cases during the civil war were, respectively, 42.8 and 49.7. The whole of the lessened mortality in these serious fractures may be credited to the protection given to the wound by the first-aid

lressing and to the care exercised in the subsequent aseptic treatment of the fractured limb.

In penetrating wounds of the thorax the rate of mortality fell from 52.6 per cent during the civil war to 27.8 per cent during the years 1898 and 1899. The civil-war reports show 8,403 cases in which the results were determined; 5,260 deaths occurred among the number. The reports for the later years, as already stated, show 198 cases, of which only 55 were fatal.

There were during the civil war 3,475 penetrating wounds of the abdomen in which the ultimate results were determined; 3,031 of these, or 87.2 per cent of the total, proved fatal. During the years 1898 and 1899 116 cases—81 fatal—were recorded, the fatal cases constituting 70 per cent of the total. Of 10 cases in which laparotomy was performed, 9 were fatal.

The alteration in the percentages of mortality in fractures of the cranium is less marked than in wounds of other parts of the body. Of 4,243 cases of cranial fracture during the civil war 2,514, or 59.2 per cent, were fatal. In 1898 and 1899 68 cases were recorded, with 37 deaths, the latter forming 54.4 per cent of the whole number.

SUICIDES AND HOMICIDES.

The following tabulations present the details of the cases of suicide and homicide which were reported during the years 1898 and 1899. The ratios of suicides per thousand of strength—0.26 in the former and 0.28 in the latter year—and that of homicides—0.13 and 0.22, respectively—are all lower than the mean annual ratios of the ten years 1888–1897:

1898.

Commands.	Mean strength.	Suicides.									Homicides.			
		Poison, narcotic.	Poison, irritant.	Hanging.	Drowning.	Incised wound.	Gunshot.	Suffocation.	Total.	Ratio per thousand of strength.	Incised wound.	Gunshot.	Total.	Ratio per thousand of strength.
Cuba:														
Regulars	3,810	....	....	....	2	....	1	....	3	0.79	....	....	....	.....
Volunteers	4,535	....	....	....	....	....	1	....	1	.22	....	....	....	.....
Total	8,345	....	....	....	2	....	2	....	4	.48	....	....	....	.....
Porto Rico:														
Regulars	1,930	....	....	....	....	....	1	....	1	.52	....	....	....	.....
Volunteers	3,763	....	1	....	....	....	....	....	1	.27	....	1	1	0.27
Total	5,693	....	1	....	....	....	1	....	2	.35	....	1	1	.18
Pacific Islands:														
Regulars	2,903	1	....	....	....	....	....	....	1	.34	....	1	1	.34
Volunteers	7,004	....	1	....	....	1	....	....	2	.29	....	1	1	.14
Total	9,907	1	1	....	....	1	....	....	3	.30	....	2	2	.20
United States:														
Regulars	37,992	2	....	2	1	1	11	1	18	.47	....	4	4	.11
Volunteers	85,269	....	1	....	....	2	8	....	11	.13	1	11	12	.14
Total	123,261	2	1	2	1	3	19	1	29	.24	1	15	16	.13
United States armies:														
Regulars	46,635	3	....	2	3	1	13	1	23	.49	....	5	5	.11
Volunteers	101,160	....	3	....	....	3	9	....	15	.15	1	13	14	.14
Total	147,795	3	3	2	3	4	22	1	38	.26	1	18	19	.13

1899.

Commands.	Mean strength.	Suicides.								Homicides.				
		Poison, narcotic.	Poison, irritant.	Drowning.	Incised wounds.	Gunshot.	Other injuries.	Total.	Ratio per thousand of strength.	Incised wounds.	Gunshot.	Other injuries.	Total.	Ratio per thousand of strength.
Cuba:														
Regulars	11,969	1	1	....	2	3	....	7	0.58	....	3	1	4	0.33
Volunteers	8,082	....	....	....	....	....	....	....	....	....	....	....	....	....
Total	20,051	1	1	....	2	3	....	7	.35	....	3	1	4	.20
Porto Rico:														
Regulars	3,347	....	....	....	....	1	1	2	.60	1	....	....	1	.30
Volunteers	380	....	....	....	....	....	....	....	....	....	....	....	....	....
Total	3,727	....	....	....	....	1	1	2	.54	1	....	....	1	.27
Pacific Islands:														
Regulars	22,922	1	....	1	2	5	1	10	.44	2	7	1	10	.44
Volunteers	16,358	....	....	....	....	5	....	5	.31	1	....	1	2	.12
Total	39,280	1	....	1	2	10	1	15	.38	3	7	2	12	.31
United States:														
Regulars	26,208	1	....	1	....	2	....	4	.15	....	5	....	5	.19
Volunteers	15,984	....	1	....	....	1	....	2	.13	....	1	....	1	.06
Total	42,192	1	1	1	....	3	....	6	.14	....	6	....	6	.14
United States armies:														
Regulars	64,446	3	1	2	4	11	2	23	.36	3	15	2	20	.31
Volunteers	41,100	....	1	....	....	6	....	7	.17	1	1	1	3	.07
Total	105,546	3	2	2	4	17	2	30	.28	4	16	3	23	.22

Decade 1888–1897 compared with 1898 and 1899.

Year.	Mean strength.	Suicides.		Homicides.	
		Number.	Ratio per thousand.	Number.	Ratio per thousand.
1888	26,739	8	0.30	5	0.1
1889	27,206	21	.77	5	.1
1890	26,684	16	.60	7	.2
1891	26,460	22	.83	8	.3
1892	26,861	22	.82	5	.1
1893	27,659	22	.80	5	.1
1894	27,674	18	.65	10	.3
1895	27,326	19	.70	1	.0
1896	27,183	12	.44	4	.1
1897	27,374	10	.37	5	.1
Mean	27,116.6	17	.63	5.5	.2
1898	147,795	38	.26	19	.1
1899	105,546	30	.28	3	.2

SPECIAL SURGICAL REPORTS.

The following list comprises the reports on surgical subjects rendered during the fiscal year ended June 30, 1900:

Name.	Rank.	Reports.
Ames, E. W	Acting assistant surgeon	History of radiographs. Report of work as pathologist in U. S. A. general hospital, Presidio, San Francisco, Cal.
Anderson, C. T. G	do	Gunshot wound, left leg.
Arthur, Wm. H	Major and surgeon	Report of surgical operations on hospital ship Missouri.
Baird, W. T	Acting assistant surgeon	Hernia. Chronic ulcer of penis.
Banister, J. M	Major and surgeon	Operation for radical cure of hernia; 4 cases.
Bevans, James L	Acting assistant surgeon	Incised wound of throat; suicide.
Borden, W. C	Captain and assistant surgeon.	Gunshot wounds observed during Spanish-American war.
Boyer, Arthur I	Acting assistant surgeon	Fracture of head of femur.
Bradley, A. E	Captain and assistant surgeon.	Appendicitis, 2 cases. Operation for radical cure of hernia.
Bratton, T. S	do	Incised wounds, arm, neck, and back.
Carling, John	Acting assistant surgeon	Report of an engagement at Iba, P. I.
Cloud, M. M	First lieutenant and assistant surgeon.	Foreign body in intestines; safety pin. Gunshot wound of chest.
Duval, Douglas F	do	Amputation of legs. Operation for radical cure of hernia.
Ebert, R. G	Major and surgeon	Operation for radical cure of hernia.
Fitzgerald, R. J	Major and surgeon, volunteers.	Report of cases occurring in First Reserve hospital, Manila, P. I.
Flagg, C. E. B	Captain and assistant surgeon.	Report of surgical operations year ending June 30, 1900.
Ford, J. H	First lieutenant and assistant surgeon.	Surgical operations Second Reserve hospital, Manila, P. I.: (1) Appendicitis; (2) nephrolithiasis.
Girard, A. C	Major and surgeon	Gunshot wound of brain, 2 cases. Operation for radical cure of hernia, 19 cases. Report of surgical operations, 59 cases. Report of surgical operations, February, 1900.
Godfrey, Guy C. M	Captain and assistant surgeon.	Method of controlling arterial hemorrhages. Report of surgical operations, December, 1899. Multiple abscess. Report of surgical operations, January, 1900. Surgical operations, February, 1900. Surgical operations, March, 1900. Surgical operations, April, 1900.
Haines, A. C	Captain and assistant surgeon, volunteers.	Report of surgical operations at Davao, P. I.
Harvey, P. F	Major and surgeon	Gunshot wound of chest.
Howard, D. C	Captain and assistant surgeon.	Tubercular arthritis, resection.
Jackson, T. W	Acting assistant surgeon	Traumatic meningitis, epilepsy. Incised wounds of neck.
Kennedy, James S	do	Gunshot wound of chest. Fracture of skull, trephining.
Kilbourne, H. S	Major and surgeon	Dislocation of left hip.
Matthews, W. S. H	Major and surgeon, volunteers.	Gunshot wound of back.
Maus, L. M	Major and surgeon	Operation for radical cure of hernia.
McMillen, M. B	Acting assistant surgeon	Gunshot wound of head.
Moseley, E. B	Major and surgeon	Gunshot fracture, left leg.
Penrose, George	Major and surgeon, volunteers.	Gunshot wound of head.
Pillow, Robert	Acting assistant surgeon	Appendicitis.
Rebert, M. A	do	Tumor, right breast, sarcoma.
Shellenberger, J. E	Major and surgeon, volunteers.	Multiple wounds.
Shimer, Ira A	First lieutenant and assistant surgeon.	Operation for radical cure of hernia, 3 cases. Traumatic epilepsy.
Skinner, George A	do	Appendicitis. Osteomyelitis.
Stark, A. N	Captain and assistant surgeon.	Surgical operations since January, 1900. Report of surgical operations: (1) Acute grangrenous appendicitis; (2) operation for disease of mastoid; (3) fracture of patella; (4) hypodermatic administration of quinine in the malaria of the Tropics.
Stone, J. H	First lieutenant and assistant surgeon.	Cœliotomy, with appendectomy and unilateral ovariotomy.
Welch, D. W	do	Gunshot wound of ankle.
Wertenbaker, C. I	Acting assistant surgeon	Gunshot wound of head. Gunshot wound of face. Gunshot wound of chest.
Willcox, Charles	Captain and assistant surgeon.	Abdominal abscess. Operation for radical cure of hernia. Report of three surgical operations: (1) Radical cure, encysted hydrocele cord, and varicocele; (2) removal of toes to correct deformity; (3) ligation of transverse facial artery.
Wilson, N. W	Acting assistant surgeon	Gunshot wound of head; suicide.
Woodruff, C. E	Captain and assistant surgeon.	Gunshot wounds, Krag-Jörgensen rifle, 2 cases.

Notwithstanding the utmost care exercised in operative surgery in the field, aseptic results, as might be expected, are not always obtained. To illustrate this, Capt. Charles E. B. Flagg, assistant surgeon, United States Army, reported the cases of two men of the Seventeenth Infantry wounded at Masapinit November 10, 1899. One was brought into the regimental hospital with a gunshot wound of the right thorax and abdomen. An incision as for right lumbar nephrectomy was made, and the liver and intestines were explored and found to be uninjured. Drainage was instituted, as the wound passed through the diaphragm and lung. The other was received immediately afterwards, with a first-aid dressing on his wounds. The aperture of entrance was just above the crest of the left ilium, the bullet (Mauser) passing upward and to the right, fracturing the spinous processes of the two upper lumbar vertebræ, but inflicting no injury on the spinal cord, as shown by absence of symptoms and by an exploratory incision. The bullet was taken from the lumbar muscles on the right. Both cases received their first dressing on arriving at Angeles on November 13. The first case was retained at this place and speedily recovered. The second was sent to the First Reserve hospital at Manila, where death occurred from septic fever November 22. The history of the latter case does not show when the infection took place; but in both cases the operative treatment at the regimental hospital was conducted with the same precautionary measures. No one but the operator and his assistant came in contact directly or indirectly with the wounds, and all instruments and dressings were carefully sterilized.

As illustrations of the military surgery of the medical department of the army in the Philippines, I here submit a report of the surgical work in the First Reserve hospital, Manila, P. I., together with reports of gunshot and bolo wounds, taken chiefly from the records of the hospital ship *Relief*.

REPORT OF THE OPERATIVE WORK AT THE FIRST RESERVE HOSPITAL, MANILA, P. I., FROM SEPTEMBER 1, 1899, TO FEBRUARY 28, 1900, BY MAJ. W. P. KENDALL, SURGEON, UNITED STATES ARMY, CHIEF OPERATOR.

Because of the large amount of work and limited assistance, this report is not complete, though it includes all important operations, with details of the most interesting. No attempt has been made to give a complete history of the cases during treatment, the final result alone being noted. With from 150 to 200 beds always filled and rapidly changing, the work alone was more than could be perfectly cared for, and histories dropped into the background.

During the first five months, and before base hospitals had been established at various points in the island, most of the larger surgical work was sent back from the line to the First Reserve hospital, which fact accounts for the large amount of work done. This was also true of the period antedating the beginning of this report, and with which it is in no way connected.

The work of Acting Asst. Surg. Ernest Robinson, United States Army, my assistant and colaborer, has merited the highest praise. His unerring judgment, great experience, and splendid technique were constant causes for remark and admiration. To him much is due for the, it is believed, excellent quality of work done during this period.

Hernia.—During the period mentioned there were performed 49 operations for the radical cure of hernia. These included 2 umbilical, 2 ventral, in old cicatrices following operations for appendicitis, and 1 femoral; the rest were inguinal of different types. The Bassini was the method generally adopted, while kangaroo tendon for the deepest layers, catgut for the second, and interrupted silkworm gut for the integument were the materials usually employed for suturing. These were sometimes interrupted, sometimes continuous. Castration was resorted to in two or three cases of undescended testicle. At first some little trouble was experienced with the suture material. This entirely disappeared when all suture material was resterilized, and afterwards primary union was the invariable rule.

Because of the numerous complaints heard after the operation, the question of the advisability of performing it has arisen; but it is believed that those who complained would have complained more without it and that their troubles were mostly imaginary, while really good men were infinitely benefited by it. It is believed, however, that no man should be enlisted with a hernia, however small, and the scar of an appendicitis operation should positively bar a man from enlistment. This applies even where there has been primary union. Most of the cases were returned to duty from four to six weeks after the operation, without a truss. One case of recurrence was observed.

Appendicitis.—There were operated upon for appendicitis 19 cases, by far the greater number having reached the abscess stage. That no uncomplicated case was lost was considered great good fortune. The appendix was removed in nearly every case, though there were a few exceptions, and in 2 of these there was a recurrence of the disease before the cases got from under observation. At the second operation the appendices were removed.

One case of chronic amœbic dysentery presented such a thickened condition in the right iliac region that an operation for appendicitis was performed, the real nature of the case not being discovered until the abdomen was opened. Such thickening of the intestinal coats I had never seen; these were friable to an extreme degree. To the casual reader this error may seem to have been unnecessary, but this case was one of the latest in a series where no error in diagnosis had been made, and no case was ever operated upon without consultation. It is reported in order to show what possibilities may arise. The case had been under observation for two months, and though a dysenteric condition was known to exist, the extent of it was not believed to be so great, and appendicitis was thought to have supervened. The tumor consisted of plastic material about the caput coli, the walls of which were enormously thickened and disorganized.

Perforation in typhoid.—One attempt to sew the perforations caused by a typhoid ulcer was made, a general anæsthetic being used; but though the intestinal wounds, two in number, looked well at post-mortem, the result was a failure. The patient lived thirty-six hours after the operation, and it was believed that had it been done some hours earlier the result might have been different.

Abscess of the liver.—There were three abscesses of the liver seen and operated upon. All gave a dysenteric history, and all were failures. To one unfamiliar with the extent to which the lesions of chronic amœbic dysentery go, this seems unnecessary, but to one who is familiar with the lesions the wonder is that any recover from intercurrent trouble. One case lived ten days, and then died of exhaustion. They were operated upon while under the influence of a general anæsthetic, the capsule and peritoneum having been united the day previous. A thermo cautery was used to open the abscess, and no hemorrhage of any moment was met with. One case was multiple, the others single.

As has been said, the pathological appearances presented by the colon at post-mortem precluded recovery from the dysentery alone.

Disarticulation at the hip, following ligation of the external iliac, traumatic aneurism.—W. C. R., first lieutenant, Thirty-sixth Infantry, United States Volunteers, was admitted December 30, 1899, suffering from a gunshot wound, Mauser, in the right Scarpa's triangle. The ball entered about 3 inches below Poupart's ligament and passed directly backward, appearing just below the gluteal fold; no fracture. The wound was received in action near Tarlac December 21, 1899.

At the time of admission the external wounds were still discharging slightly, and a pulsating tumor at the base of the triangle extended above Poupart's ligament. It was decided that the ligation of the main artery offered the only chance to save life, and accordingly, on January 3, 1900, the patient was anæsthetized and an incision 3 inches long was made just above Poupart's ligament and parallel with it. Separating the peritoneum from the pelvic wall the external iliac was easily reached, and a ligature of heavy silk thrown around it about 1½ inches above the ligament. The patient rallied well from ether, but the circulation was not reestablished, and four days later, a line of demarkation showing, it became necessary to amputate. Disarticulation at the hip joint was done by Wyeth's bloodless method; an unhealthly short anterior flap and a better and long posterior one was secured. The patient was greatly shocked, and venous injection of 3 pints of normal salt solution was resorted to besides strychnia and brandy hypodermatically. After hours of extreme collapse the patient slowly rallied, and but for a slight mental aberration, which appeared some two weeks later and continued for a week, made an uneventful recovery. The anterior flap, notwithstanding its badly infiltrated and discolored condition, did not break down, and the final result, the conditions considered, was perfect.

Gunshot wounds.—The experience with gunshot wounds confirms that of others, viz: That they are generally aseptic and show infection only when exposed after the receipt of the injury. Those which were flesh only, when carefully dressed,

healed rapidly and without suppuration. The majority of wounds suppurated, but this was undoubtedly due to contamination upon the field, as frequently proven by the healing without suppuration in the carefully dressed cases. The use of the first-aid package carried by individuals proved of inestimable value.

Wounds complicated by bone and even joint injuries followed the above rule, and when kept pure healed with surprising rapidity and often with slight or no permanent injury, though destruction of tissue in some cases was considerable; in one or two instances the ball passed through the kneejoint, yet left no lasting disability or loss of motion.

As to the effect upon tissue which the small-sized modern rifle ball produces, it is not thought that the experience modifies accepted opinions, but rather confirms them. The openings of entrance and exit did not differ so much in appearance as one would expect, the rule being that the difference was apparent, though cases were not wanting in which it was impossible to tell in which direction the ball had traveled. In the majority of cases foreign material from the clothing was not carried by the missile into the tissues.

Time was wanting, though other opportunities offered, to make a careful study of the explosive effects of the small-caliber ball at different ranges. As a rule, however, wounds were received at comparatively short range and the explosive effect was present.

The 3 following cases owe their interest to the fact that they became infected with the bacillus aerogenes capsulatus prior to admission to the hospital, and they were the only cases so infected between the dates of September 1, 1899, and March 1, 1900.

In all 3 cases the exact condition was not detected upon admission, but rapid changes, both constitutional and local, soon made it apparent that we were not dealing with ordinary infection.

Case I.—A captain of the Thirty-sixth Infantry, United States Volunteers, was admitted to hospital about 7 o'clock in the evening with a flesh gunshot wound of the right leg in its middle portion. No fracture existed; the wound had been antiseptically dressed, it was supposed, in the field. The patient was suffering considerable pain, which was thought to be due alone to the extravasation in the muscles of the calf, the parts being considerably swollen, tense, and ecchymotic. An evaporating lotion was prescribed, and the patient was left for the night. He received one-half grain of morphine during the night. I was called early in the morning to see him because of the pain he was suffering. To my surprise the swelling which the night before did not extend above the lower border of the popliteal space had now reached Poupart's ligament, was fairly tense, ecchymotic, and crepitation existed everywhere beneath the integument, which, particularly from the lower third of the thigh downward, was covered with blebs containing a sero sanguinolent fluid, while bubbles appeared in the wound and a cadaveric odor was noticed. The pain was severe and the patient already in profound shock.

He was immediately taken to the operating room, where a consultation decided that a high amputation offered the only hope of saving life, and although the case was considered hopeless, an amputation at the middle of the thigh was done, but notwithstanding all possible stimulation the patient sank rapidly and died soon after leaving the table. The microscope revealed the presence of the bacillus aerogenes capsulatus.

Case II.—Private R. R., Company A, Thirty-seventh Infantry, United States Volunteers, was admitted January 24, 1900, suffering with a flesh gunshot wound of the lower third of the right thigh. No fracture; the wound had been dressed on the field three days before, and though it looked badly the condition was not diagnosed. After a thorough cleaning under ether a large rubber drainage tube was introduced, and the wound having been put up in a wet dressing, the patient was returned to the ward.

Next day he was profoundly shocked; the entire limb was badly swollen and ecchymotic; crepitation beneath the integument and exuding gas from the wound existed, together with the peculiar cadaveric odor. As extreme surgical interference was out of the question, several long incisions, laying open all the deep layers of fasciæ, were made over both thigh and leg; the patient was immediately placed in a continuous bath of the temperature of 104°, and all possible stimulation kept up, but he sank rapidly and died four hours later. Bacteriological examination revealed the presence of the bacillus aerogenes capsulatus.

Case III.—A. O'N., private, Company F, Thirty-ninth Infantry, United States Volunteers, was admitted on the same date as the previous case, January 24, 1900, having received at the same time, January 21, and place a flesh gunshot wound of the right buttock. Like the other, it was not considered dangerous, there being no fracture of any of the bones or injury to the vessels. The wound was cleansed, dressed antiseptically, and the patient returned to the ward. Next day nothing

serious was suspected; a drainage tube having been introduced and the wound dressed, he was returned to bed. At this dressing a scarlatinous rash over the entire body was apparent. This had practically disappeared twenty-four hours later, but the conditions had now become suspicious. In a milder degree all conditions mentioned in the previous cases were apparent, and the feeble and rapid pulse indicated that we were dealing with our old enemy. The patient died some ten hours later. Microscopical examination confirmed the diagnosis, bacillus aerogenes capsulatus being present.

An extreme degree of shock, with all its accompanying symptoms, was a marked feature in all these cases.

Private F. T., regiment not given, was shot near Calamba, P. I., in action with the Filipino insurgents, the ball entering about one inch below the center of the left clavicle; no exit; no fracture of ribs. The immediate effect was shown by considerable shock and profuse hemorrhage, which was controlled by pressure. He reached the hospital about thirty-six hours after the receipt of the injury, anæmic from the hemorrhage and very weak, pressure still kept up. Upon removing the dressing the hemorrhage did not continue and the wound was dressed antiseptically. The patient steadily improved, no further hemorrhage occurred, and the wound healed. Some two weeks later a pulsating tumor about the size of a hen's egg was discovered in the outer portion of the subclavicular space.

As this was growing rapidly and already causing considerable pain in the arm, it was decided to tie the subclavian artery. The usual incision was made about three-fourths of an inch above the clavicle and parallel with it. Considerable difficulty was experienced in locating the artery, due to the absence of the normal conditions which the extravasation of blood into the neighboring tissues and subsequent inflammation had produced, and when found it was discovered that to get well above the tumor it was necessary to throw the ligature inside of the outer border of the scalenus anticus muscle, thus really tying in the second part of the artery.

No further trouble was experienced; the wound healed by first intention, and three weeks later the patient was sent to the United States. The temperature of the arm was restored in about forty-eight hours; sensation had been restored as far as the wrist when he left the hospital, but as yet the loss of the power of motion was complete.

The kneejoint was opened three times for recent fracture of the patella, the fragments wired, and primary union obtained with perfect motion in each case.

One case of tetanus occurred in the person of a native, with fatal result.

Erysipelas was not seen.

One cystic ovarian tumor, weight 40 pounds, was successfully removed.

The small number of venereal cases is accounted for by the fact that this was a distinct department and those operations were done at another point.

Anæsthetics.—Regarding the choice of anæsthetics there was an apparent difference, not seen in the United States, between ether and chloroform. Whether this would disappear after a longer experience and some modified way of administration or not was not determined; but, as it was, we all grew to be afraid of chloroform, including those whose experience with it had been large, even to the exclusion almost of ether. Heart failures came on rapidly and with great severity, producing death in two chronic appendicitis cases before the operation was begun. Besides these there were several cases of suspended animation, while with ether no trouble was observed.

Our experience fully confirms that of those who claim that in hot countries the paralyzing effect of chloroform is greater than when used in colder climates, due, probably, to the lack of tone of the motor nerves.

In the following table the various operations are classified and the results in each shown:

Operations.	Total.	Recovered.	Died.	Operations.	Total.	Recovered.	Died.
Abscesses, large	52	51	1	Dislocations	2	2	....
Abscess of liver	3	.....	3	Enucleation of the eye	3	3	....
Amputations	15	13	2	Exostosis—1 humerus, 1 femur	2	2	....
Amputation, hip joint for gunshot wound	2	1	1	Fistula in ano	12	12	....
Amputation of humerus	1	1	....	Fractures, simple	19	19	....
Amputation of thigh	4	3	1	Gunshot wounds:			
Appendicitis	19	17	2	Flesh	142	139	3
Carbuncle	3	1	2	With fractures	32	27	5
Castration	2	2	....	Hemorrhoids	35	35	....
				Hernia, all varieties	49	49	....

Operations.	Total.	Recovered.	Died.
Hydrocele	7	7	....
Incised wounds, flesh	16	15	1
Ingrowing toe nail	6	6	....
Intracapsular fractures	2	2	....
Ischio-rectal abscess	7	7	....
Lacerated wounds	22	22	....
Ligations:			
External iliac, recovery after amputation at hip joint	1	1	....
Femoral artery	1	1	....
Subclavian artery, second part	1	1	....
Temporal artery	1	1	....
Ovariotomy	1	1	....
Salivary fistula	1	1	....
Simple fracture, patella, wired, recovery with perfect motion	3	3	....
Sprains	6	6	....
Tenotomy for strabismus	5	5	....
Tetanus	1	....	1
Trephining, gunshot wound	1	....	1
Urethrotomy:			
External	1	1	....
Internal	4	4	....
Varicocele, Bennet's operation	13	13	....
Benign tumors	7	7	....
Empyema, exsection of seventh and eighth ribs	3	2	1
Epithelioma, face	1	1	....
Exsection elbow joint	1	1	....
Mastoid, Schake Schwartz	1	1	....
Osteomyelitis	2	2	....

ABSTRACTS FROM THE RECORDS OF THE U. S. HOSPITAL SHIP RELIEF.

[Operations by Maj. H. O. Perley, surgeon, United States Army.]

Gunshot wound of face.—J. L., private, Company K, Forty-third Infantry, United States Volunteers. Transferred to hospital ship *Relief* from hospital, First Battalion, Forty-third Infantry, United States Volunteers, Tacloban, Leyte, P. I., April 30, 1900.

Diagnosis on transfer slip: Gunshot wound right side of face, one-half inch from nose, by small-caliber bullet. Bullet supposed to be lodged in head. Occurred in attack on insurrectos at La Paz, Leyte, P. I., April 26, 1900. Severe. Condition on admittance, good. Temperature, normal. Diagnosis made on *Relief:* Severe gunshot wound of face. Entrance, three-fourths inch below inner cathus, right eye. No exit. Slight purulent discharge; foul odor resembling ozena. X-ray examination showed faintly dark object deeply within tissues of head in plane in front of ears. Inspection and palpation showed slight bulging in front of left ear just below zygomatic process.

Operation May 1, 1900: Curvilinear incision 2 inches long, with concavity forward, made one-half inch in front of left ear. Dissection made down to bone. Bullet felt in left zygomatic fossa; body of bullet resting just below floor of left orbit in antrum of Highmore. Nondeformed Remington bullet extracted through zygomatic fossa and between zygomatic process and sigmoid notch. Nasal process, right superior maxillary bone shattered; floor of left orbit fissured and posterior surface left superior maxillary bone perforated. Track of bullet irrigated; rubber drainage tube inserted through entire track and antiseptic dressings applied.

Operation May 25, 1900: Tenderness along left upper molars, continued inability to masticate and œdema over anterior surface left superior maxillary region led to suspicion of pus in left antrum. Second molar tooth was extracted (and placed in antiseptic solution with view to its being subsequently replaced in jaw). A puncture was made into floor of antrum. No pus was found.

Gunshot fracture of humerus.—H. C. L., private, Company H, Forty-third Infantry, United States Volunteers. Transferred to hospital ship *Relief* from post hospital, Kalbayok, Samar, P. I., May 1, 1900.

Diagnosis on transfer slip: Gunshot wound, region left elbow. General condition, fair. Diagnosis made on *Relief:* Two severe gunshot wounds left arm. (1) Entrance, inner side of arm, 2 inches above and one-half inch within external condyle. Exit, posterior surface, median line, 4 inches above tip of olecranon, fracturing humerus. (2) Entrance, one-half inch above and one-half inch within external condyle, antero-external surface. Exit, posterior surface, one-half inch above and one-half inch within wound of entrance. All wounds badly infected. Great general tumefaction. Received in action at Catubig, Samar, P. I., April 16, 1900.

Operation May 1, 1900: Humerus found fractured, obliquely from before, backward, and upward, line of fracture being opposite upper wound at junction of lower and middle thirds. Supercondyloid ridge notched along track, lower wound. Several small fragments of bone removed, and brass-jacketed Remington, greatly deformed, found beneath deep fascia, behind lower wound of exit. Rubber drainage tubes inserted and plaster of paris splint applied.

Gunshot fracture of humerus.—F. E., private, Company K, Eighteenth Infantry, United States Army. Transferred to hospital ship *Relief*, from hospital Eighteenth Infantry, Capiz, Panay, P. I., April 19, 1900.

Diagnosis on transfer slip: Partial anchylosis of right elbow, result of gunshot wound with compound comminuted fracture of lower third, humerus. Received in engagement with insurgents February 5, 1900, at Dao, Panay, P. I. Condition on admission: General health, excellent. Diagnosis made on *Relief:* Severe gunshot wound right arm. Wound of entrance on outer surface of right forearm, 4 inches below external condyle; exit posterior surface of arm, 4 inches above olecranon process. Wound of entrance one-half inch in diameter. Wound of exit: large irregular scar, 4 inches long and 1½ inches wide. Both wounds healed. Elbow joint anchylosed (fibrous). Humerus broken, fibrous union, lower fragment tipped inward and forward at angle of 120° with upper fragment. Seat of fracture 2 inches above elbow joint. Wrist and fingers anchylosed (fibrous).

Operation, May 5, 1900: Anchylosis of fingers, wrist, and elbow broken up under anæsthesia. Humerus refractured. Fragments manipulated. Arm reset, right angle splint.

Gunshot fracture of ulna.—G. H. O., private, Company C, Forty-third Infantry, United States Volunteers. Transferred to hospital ship *Relief* from First Battalion hospital, Forty-third Infantry, United States Volunteers, Tacloban, Leyte, P. I., April 30, 1900.

Diagnosis on transfer slip: Shot in skirmish with insurrectos, between Tanuan and Dagame, Leyte, P. I., March 31, 1900. Entrance wound, anterior internal surface, middle third, right forearm. Exit wound, posterior external surface, same region, causing compound comminuted fracture of ulna, and probably dividing ulnar nerve. By bullet, probably Remington. Severe. General condition on admission, fair. Slight evening temperature. Diagnosis made on *Relief:* Severe gunshot wound of right forearm. Entrance, inner surface of forearm in line with and 4 inches below inner condyle. Wound nearly closed. Slight exuberant granulations. Exit, ulnar side, one-half inch internal and 5 inches below olecranon process, large granulating wound 4 by 1½ inches, discharging pus. Deep cavity in center leading to space from which fragments of ulna have been taken. Wound cleansed and antiseptic dressing applied. X-ray examination showed 3 inches of ulna gone at junction of upper and middle third; also foreign body 4 inches below crease of elbow, and one-half inch internal to the radius.

Operation, May 5, 1900: Two small fragments of shell, ¼ by ⅛ inch each, and 1 inch carious bone from lower fragment of ulna removed. Suppurating cavity irrigated and packed with iodoform gauze.

Gunshot wound of abdomen.—P. M., private, Company B, Fourth Cavalry. Transferred to the hospital ship *Relief* from field hospital, Niac, P. I., January 10, 1900.

Diagnosis on transfer slip: Perforating gunshot wound (Mauser). Entrance, 1 inch to right and above symphysis pubis. Exit, 2 inches above and posterior to great trochanter, right femur, ball passing through abdomen and ilium. Received in action near Niac, P. I., January 9, 1900.

Operation, January 11, 1900, 8 p. m.: Incision from navel to symphysis. Localized peritonitis, lower part of abdomen. Perforation one-half inch in diameter, in ileum, sewed up with Lembert suture. Cavity flushed and drainage established. Died 12.20 a. m., January 12, 1900, from shock following peritonitis, result of severe perforating gunshot wound of abdomen.

Gunshot wound of ischium.—C. C., sergeant, Company H, Forty-seventh Infantry, United States Volunteers. Transferred to hospital ship *Relief* from regimental hospital, Forty-seventh Infantry, United States Volunteers, Legaspi, P. I., May 2, 1900.

Diagnosis on transfer slip: Severe perforating wound of body. Wound of entrance 4 inches above Poupart's ligament. Wound of exit posterior aspect, junction of middle and upper third, left thigh. Slight nonpenetrating wound, front of right thorax, contused, 4 inches long and 2 inches to left of sternum. Wounded near Ligas, April 11, 1900. Both wounds caused by Remington bullet, fired from a hill not over 30 paces. Condition on admission, fair. Pulse slow, soft, and compressible. Temperature, 99°. Skin, normal color. Patient in good flesh. Tongue slightly coated. Diagnosis made on *Relief:* Slight abraded wound, 3 by ¾ inches along costal margin, left breast. Gunshot wound, left groin. Entrance midway between anterior superior spine of ilium and symphysis pubis. Wound of exit, left buttock, one-half inch below tuberosity of ischium. Skin undermined about wound of entrance for a distance of 2 inches below wound. Induration surrounding wound of exit. Slight discharge on admission; no odor. Small amount of pus from each wound on pressure. Track of ball irrigated from below, water coming through upper wound free and clear. Gauze dressing applied. Condition remained much the same until

10 a. m. May 5, when temperature rose to 104.8°. Examination of blood showed no plasmodium malariæ.

Operation, May 6, 1900: Both wounds enlarged. Tuberosity of ischium found grooved one-third inch deep along internal surface. Several minute fragments of bone and piece of jacket of bullet ½ by ¼-inch removed. Track of bullet curetted. Through and through rubber drainage tube inserted and antiseptic dressings applied. Temperature dropped immediately after operation, reaching normal on third day.

Gunshot fracture of thigh.—J. J. H., sergeant, Company A, Forty-seventh Infantry, United States Volunteers. Transferred to hospital ship *Relief*, from hospital Forty-seventh Infantry, Donsal, Luzon, P. I., May 9, 1900.

Diagnosis on transfer slip: Perforating gunshot wound, left thigh, lower third, with fracture. Wounded in action at Bonaugurau, Luzon, Friday, May 4, 1900. Condition on admission, good. Temperature, 102°. X-ray examination negative. Both wounds foul. Much swelling of thigh and leg. Large ecchymosis around wound of entrance. Diagnosis made on *Relief*: Severe gunshot wound, left thigh. Entrance 4 inches above upper border of patella, passing transversely through, producing compound comminuted fracture of femur. Exit posterior surface median line, on same plane as entrance. Both wounds 1 inch in diameter, evidently caused by Remington. Received in action at Bonaugurau, Luzon, P. I., May 4, 1900.

Operation May 10, 1900: Free incisions made over both wounds. Bone found shattered for distance of 1½ inches above and 1½ inches below line of bullet. Lower fragment of shaft drawn downward and backward behind upper fragment. Eight or ten small fragments of detached and denuded bone, from ½ to 2 inches in length, removed. Ends of upper and lower pieces of bone found denuded for 1 inch and removed with bone forceps. Through and through rubber drainage inserted, wounds packed with iodoform gauze, antiseptic dressings and splints applied.

Gunshot fracture of thigh.—L. R., private, Company G, Forty-third Infantry United States Volunteers. Transferred to hospital ship *Relief* from post hospital, Kalbayok, Samar, P. I., May 1, 1900.

Diagnosis on transfer slip: Gunshot wound, right thigh, with fracture femur. Bullet extracted May 1, 1900. Condition on admission, poor, emaciated, restless. Pulse, rapid. Temperature, 102.2°. Diagnosis made on *Relief:* Severe gunshot wound right thigh: Entrance, 4 inches above inner border of patella. Exit at junction of internal and posterior surface of thigh, one-half inch below wound of entrance, producing compound comminuted fracture of lower third of femur. Thigh much swollen and ecchymosed.

Operation, May 2, 1900: Examination showed oblique fracture from above downward and forward at junction of middle and lower third; several fragments of detached bone, ranging in size from ½ to 1 inch, removed. Sinus burrowing upward behind adductor muscles, found and curetted. Counter opening made 4 inches above wound of exit. Three pieces of lead ¼ inch in diameter and one piece denuded bone 2 by ½ inches removed. Wound irrigated. Rubber drainage tube inserted, antiseptic dressing, splints, and extension applied.

Gunshot fracture of thigh.—G. A. W., first sergeant Company I, Twenty-third Infantry, United States Army. Transferred to hospital ship *Relief* from regimental hospital Forty-third Infantry, Tacloban, Leyte, P. I., April 30, 1900.

Diagnosis on transfer slip: Gunshot wound, left thigh, probably Remington bullet. Entrance wound anterior internal surface, middle third, causing compound comminuted fracture of femur. Exit, posterior external surface. Severe. In battle with insurrectos at La Paz, Leyte, P. I., April 26, 1900. Condition on admittance, poor. Pulse, small, thin, rapid, and irregular. Temperature, 101.4°. Some emaciation. Complexion, dark and muddy. General exhaustion, all indicating profound sepsis. Wounds of entrance and exit both foul, exuding chocolate-colored grumous pus, extremely malodorous. Thigh greatly swollen and œdematous. Abscess cavity at posterior surface of thigh containing at least 6 ounces of pus.

Operation May 1, 1900: Three detached fragments of bone, each about 1½ by ½ inches, lying in track of bullet, were extracted. Marrow cavity, both fragments, filled with dark, grumous, foul-smelling pulp. This was curretted. Anterior surface of upper fragment denuded for distance of 3 inches from fracture. Line of fracture oblique; extending upward and backward, displacement slight. Amount of shortening ½ inch. Muscular tissue broken down and pulpified in all directions. Numerous sinuses filled with pus were opened and cleansed. Through and through rubber drainage tubes inserted. Cavities thoroughly flushed and packed and antiseptic dressings and splints applied. Throughout the operation patient's pulse were weak and irregular, necessitating several injections of strychnine and atropine. On recovering consciousness, condition still being bad, two quarts of saline infusion were given subcutaneously. Patient rallied somewhat from the immediate effects of the operation, but died from exhaustion and sepsis twenty-four hours later.

Gunshot wound of thigh, etc.—H. C., corporal, Company A, Forty-third Infantry, United States Volunteers. Transferred to the hospital ship *Relief* from First Battalion hospital, Forty-third Infantry, United States Volunteers, Tacloban, Leyte, P. I., April 30, 1900.

Diagnosis on transfer slip: Gunshot wounds as follows: Bullet entered left leg at outer surface, upper third of thigh, and emerged from inner surface same region, passing behind bone; then entered right leg, inner surface, lower third of thigh, and lodged against bone, from whence it was removed. Severe. Contused lacerated wounds (slight), as follows: One, back of left elbow; one, outer surface, left arm; and one, anterior surface, right wrist. Wounds in leg inflicted by Remington bullet, and those in arm probably by chips fired from a gun. Fired upon by insurrectos on April 27, 1900, while traveling the road between Tacloban and Polo, Leyte, P. I. General condition, good. Diagnosis on *Relief:* (1) Severe gunshot wound left thigh. Entrance, 6 inches below and 1 inch posterior to great trochanter; direction, inward, emerging same plane as wound of entrance, on inner surface (bone not involved); then entered (2) right thigh, on internal surface, 4 inches above internal condyle. No exit. Wound of entrance in left thigh presents sloughing surface 1½ inches in diameter. Exit wound clean, one-half inch in diameter. Through-and-through rubber drainage established, and antiseptic dressings applied. Wound in right thigh 1½ inches in diameter and very ragged, penetrating to depth of 2 inches. Patient states bullet was extracted from this wound. Bone not involved. Wound irrigated and packed with gauze. Antiseptic dressings applied. (3) Slight abraided gunshot wound, posterior surface, center of left forearm, 2 inches long; direction vertical. (4) Slight abraded gunshot wound over internal condyle, left humerus. (5) Slight penetrating gunshot wound, anterior surface right wrist. X-ray examination showed small foreign body lying in front of base of fifth metacarpal bone.

Operation, April 30, 1900: Incision made and two fragments of shell, each one-fourth inch in diameter, removed. Incision sutured. Antiseptic dressings applied.

Gunshot fracture of thigh.—E. E. S., private, Company M, Fortieth Infantry, United States Volunteers. Transferred to hospital ship *Relief* from post hospital, Cagayan, Mindanao, P. I., April 11, 1900.

Diagnosis on transfer slip: Perforating gunshot wound, right thigh, with fracture of right femur. Bullet entered near trochanter, and passing toward the left, emerged on inner aspect of leg. Exact character of bullet not known. Also a perforating incised wound of left leg from a spear. The spear entered on outer aspect of thigh 3 inches above knee and emerged on outer aspect of leg 3 inches below knee. Injury received in engagement with insurrectos at Cagayan, Mindanao, P. I., April 7, 1900, during an attack on the town at 5 a. m. General condition, excellent. Diagnosis made on *Relief:* (1) Severe gunshot wound, right thigh. Bullet entered outer surface one-half inch below great trochanter, passed inward and backward, fracturing femur, emerging posteriorly at gluteal fold, 1½ inches from anal orifice. (2) Severe contused wound, left lower extremity, inflicted with a spear. Spearhead entered on outer aspect of thigh 3 inches above knee and emerged on outer aspect of leg 3 inches below knee, severing larger part of head of fibula. Received in action at Cagayan, Mindanao, P. I., April 7, 1900.

Operation, April 12, 1900. Wounds right thigh clean. Simple dressings and splints applied. Wounds left thigh and leg very foul and covered with fungous granulations. Spear wounds enlarged, cleansed, and swabbed out with pure carbolic acid, followed by alcohol. Severed piece of head of fibula three-fourths inch long removed. Abscess cavity found in popliteal space, left side, immediately behind track of spear. Opened, irrigated, and curetted. Two large rubber drainage tubes inserted, one from thigh wound to popliteal opening, other from leg wound to popliteal opening. Antiseptic dressings applied. Wounds right thigh healed in a few days, leaving small linear scars scarcely visible in five weeks' time; evidently caused by Mauser. Much displacement forward and outward of upper fragment. Inclined plane 2 feet high at base placed under limb. Twenty-five pounds extension applied. Heavy pad placed over upper fragment. Position of fragments with these appliances was good. Irritation of skin at points of pressure was so great, due to heat and profuse perspiration, that extension and pressure over upper fragment had to be frequently removed and ulcerated skin treated. Due to this, and in spite of numerous devices tried, this fracture united with 3 inches of shortening and much deformity of the upper fragment. The wound of the left lower limb healed slowly by granulation.

Operation May 25, 1900: Pressure on the sharp projecting upper fragment of the right femur became so great as to indicate speedy ulceration. An incision was made and 1½ inches of bone removed with bone forceps. The incision was closed and an aseptic dressing applied.

Gunshot fracture of femur.—C. M., sergeant, Company I, Fortieth Infantry, United States Volunteers. Transferred to hospital ship *Relief* from post hospital, Cagayan, Mindanao, P. I., April 11, 1900.

Diagnosis on transfer slip: Penetrating gunshot wound of left thigh. Bullet entered just in front of trochanter and, passing diagonally backward, lodged just under skin in left buttock. Left pelvic bone probably suffered partial fracture, but left hip joint and femur apparently escaped injury. Injury received in engagement with insurrectos at Cagayan, Mindanao, P. I., April 7, 1900, during an attack on the town by the insurrectos at 5 a. m. General condition on admission, fair. Temperature, from 101° to 102°. Pulse, 120. Diagnosis on *Relief:* Severe gunshot wound, left thigh. Bullet entered laterally below great trochanter, passed diagonally backward, and lodged under skin of left buttock, about 2½ inches from anal orifice.

Operation, April 12, 1900. Wound foul. Upper portion of femur extending 1½ inches below great trochanter found shattered. Left ilium partially fractured from acetabulum upward. Incision made through skin over bullet, which, with several fragments of denuded bone from 1 inch to 2 inches long, was removed. Through-and-through rubber drainage inserted. Wound packed with iodoform gauze. Antiseptic dressings and splints applied. Temperature and pulse remained about the same as before the operation. Patient grew steadily weaker and more apathetic. A week after operation a distinct odor of dead bone was perceptible on changing dressings.

Operation, April 21, 10 a. m.: Head of femur excised. Tip of lower fragment sawed off. Excised fragment found carious. Wound packed with gauze and dressings applied. Throughout operation patient's pulse very weak and irregular. Hypodermic injections of strychnine given up to one-tenth grain. Also warm saline infusions injected under skin of flanks up to 2½ quarts. Patient regained consciousness and conversed with those near by, but sank rapidly again, and died at 3.15 p. m., April 21, of septicæmia and shock.

Gunshot fracture of femur.—W. D. H., private, Company I, Thirty-eighth Infantry, United States Volunteers. Transferred to hospital ship *Relief* from hospital Thirty-eighth Infantry, Batangas, P. I., March 26, 1900.

Diagnosis on transfer slip: Severe gunshot fracture (Mauser) lower third, right thigh. Ball entered outer aspect of thigh, just below middle, passing slightly downward to inner side of thigh. No exit. Received in action near Cuecera, Luzon, P. I., March 15, 1900. X-ray examination showed fracture of femur at junction of middle and lower thirds, with bullet lying against bone on inner side. General condition poor.

Operation, March 27, 1900. Wound foul. Incision two inches long made on inner side of thigh. Dissection made down to femur; deformed Mauser bullet extracted. Foul wound of entrance curetted. Several small loose fragments of bone removed. Wound irrigated, rubber drainage inserted. Antiseptic dressing, splints, extension, and counter extension applied. May 10, good union of bone. Wounds nearly healed.

Operation, May 26, 1900: Both wounds are closed. Patient has had for several days an irregular temperature, ranging from 100° to 103°, with some pain in region of the fracture and slight fluctuation on anterior surface of thigh over seat of fracture. Old wounds were incised. About one-half ounce of sanious pus removed. An opening 1 inch long by one-fourth inch wide was found on posterior surface of femur, leading into marrow cavity. Marrow cavity smooth and empty for distance of about 3 inches in each direction. Rubber drainage inserted into marrow cavity in each direction and antiseptic dressings applied. Temperature normal the following day.

Gunshot injury of femur.—W. M., private, Company I, Twenty-third Infantry, United States Army. Transferred to hospital ship *Relief* from hospital First Battalion, Forty-third Infantry, United States Volunteers, Tacloban, Leyte, P. I., April 30, 1900.

Diagnosis on transfer slip: Gunshot wounds as follows: (1) Small-caliber bullet, probably Krag or Mauser, entered right leg 2 inches to right and below anterior superior spinous process of ilium, ranged downward and inward, and emerged from posterior internal portion upper third of thigh. (2) Remington bullet entered inner side left instep and, passing downward, emerged from sole of foot beneath instep. During attack at La Paz, Leyte, P. I., April 26, 1900. Moderately severe. Condition on admission, fair. Temperature, 101°. Extremely anæmic. Diagnosis made on *Relief:* (1) Severe gunshot wound right thigh. Entrance, outer side right thigh, 3 inches below anterior superior spine of ilium; exit, at junction of internal and posterior surface, 2 inches below gluteal fold. Entrance wound, one-third inch in diameter; exit, same size. Free motion. Hip joint not involved. Slight purulent discharge from both wounds. Much ecchymosis on internal posterior surface of thigh, extending 5 inches below wound of exit. Foreign body felt on palpation 2 inches below wound of exit. Incision made, under cocaine (May 3, 1900), and deformed

Remington bullet with shell removed, each lying separately. Dressed antiseptically. (2) Slight gunshot wound of right foot, 2½ inches below internal malleolus. Exit, center of plantar surface, 2 inches from wound of entrance. Entrance wound, 1 inch in diameter; exit wound, one-half inch in diameter. Both irregular. Bone not involved. Drainage inserted and antiseptic dressing applied. Temperature dropped to 99.2° second day after admission, or sixth day after injury; ranged between 99.2° a. m. and 100.5° p. m. until May 6, sixth day after admission or tenth day after injury, when he experienced a slight chill at 10 a. m., followed by rapid rise of temperature, reaching maximum of 104.6° at 7 p. m. Temperature of following morning, 102.6°. Patient complained of much pain and tenderness along the bullet track; slight swelling just below Poupart's ligament, with pain on pressure.

Operation, May 7, 1900: Wound of entrance found healed. Vertical incision 4 inches long made, with wound at center of incision; dissection made down to great trochanter; nothing abnormal found. Wound of exit exuding small amount of grumous pus; this wound enlarged by vertical incision 4 inches in length. Large sloughing sinus found extending down to bone just above lesser trochanter. Deep groove found extending obliquely from above downward across anterior surface of shaft just above lesser trochanter. Numerous small fragments of bone, together with fragment of brass-jacketed Remington one-half by one-half inch, removed. Muscular tissue surrounding the sinus much softened and broken down. Cavity curetted and large drainage tube inserted from wound of entrance to wound of exit in front of bone. Cavities packed with iodoform gauze and antiseptic dressing applied.

Gunshot wound of thigh.—C. L. B., corporal, Company D, Fortieth Infantry, United States Volunteers. Transferred to hospital ship *Relief* from hospital, Nueva Caceres, Luzon, P. I., May 7, 1900.

Diagnosis on transfer slip: Gunshot wound, upper third right thigh. General condition on admission, good. Wound foul. X-ray examination negative as to foreign body. Femur seen clearly throughout entire length and found not fractured. Diagnosis made on *Relief:* Moderate gunshot wound, right thigh. Entrance: At apex of Scarpa's triangle. No exit. Received in action near mouth of Rio Picol, southern Luzon, P. I., February 27, 1900.

Operation, May 9, 1900: Wound enlarged by vertical incision, and drainage tube, 5 inches long, discovered and removed. This tube was lying at a depth of 1 inch below surface, and according to patient's statement had been there since shortly after injury, two months before, it being supposed to have slipped out of the wound during change of dressings, and to have been lost. The sinus formed by this tube was curetted and packed with iodoform gauze and antiseptic dressing applied.

Gunshot fracture, knee joint.—G. W. H., private, Company I, Forty-seventh Infantry, United States Volunteers. Transferred to hospital ship *Relief* from regimental hospital, Forty-seventh Infantry, United States Volunteers, Legaspi, P. I., May 2, 1900.

Diagnosis on transfer slip: Penetrating gunshot wound, inner side right kneejoint. Received in action near Malabog, April 20, 1900. Condition on admittance, fair. Pulse, full and rapid. Temperature, 102°. Skin, sallow. Tongue covered with yellow coating. Entire right leg swollen from center of thigh down. Marked œdema below wound. Both incisions, together with wound of entrance, exuding thick, creamy pus. Dressing saturated. Foul odor. Diagnosis made on *Relief:* Severe gunshot wound. Entrance, one-half inch behind and one-half inch below internal tuberosity, right tibia. No exit. Two additional openings in postero-internal surface, one 2 inches below popliteal space, one 7 inches below popliteal space. Drainage tube connecting both wounds.

Operation, May 3, 1900: Wound of entrance enlarged. Lower surface, inner tuberosity of tibia, found shattered; numerous fragments of bone removed. Mauser bullet in two fragments, together with fragments of shell, found and removed. Bone curetted, rubber drainage tube inserted, cavities packed with iodoform gauze, and antiseptic dressings applied. Temperature dropped immediately, reaching normal third day after operation.

Gunshot fracture of fibula.—M. J. E., private, Company H, Forty-third Infantry, United States Volunteers. Transferred to hospital ship *Relief* from post hospital, Kalbayok, Samar, P. I., May 1, 1900.

Diagnosis on transfer slip: Gunshot wound, calf of right leg. General condition, fair. Temperature, 100°. Diagnosis made on *Relief:* Severe gunshot wound, right leg. Entrance, inner side of calf, 5 inches below internal condyle. Exit, outer surface, 4 inches below head of fibula, one-half inch anterior to wound of entrance. Fibula fractured. Both wounds slightly purulent. Received in action at Catubig, Samar, P. I., April 19, 1900.

Operation, May 1, 1900: One and one-half inches of shattered fibula removed. Drainage tube inserted, connecting both wounds. Irrigated and antiseptic dressing applied.

Dagger wound of arm.—R. M. L., corporal, Company G, Forty-third Infantry, United States Volunteers. Transferred to hospital ship *Relief* from post hospital, Kalbayok, Samar, P. I., May 21, 1900.

Diagnosis on transfer slip: Punctured wound by dagger, left arm, flesh. Diagnosis made on *Relief:* Severe punctured incised wound, by dagger, left arm. Received in action at Kalbayok, Samar, P. I., April 26, 1900. Entrance, middle of anterior surface, left arm, 3 inches above bend of elbow. Wound transverse, 1¼ inches long. Exit, posterior surface of arm on plane 1½ inches above wound of entrance. Both wounds entirely healed when patient was admitted. Bone apparently not injured. Section of musculo-spiral nerve, manifested by wrist drop and paralysis of extensor muscles of forearm. Biceps partially severed.

Operation, May 6, 1900: Incision (vertical) 2 inches long, posterior surface of arm, in line between biceps and triceps; musculo-spiral nerve found severed and ends retracted, each end curled upon itself. Large bulbous swelling on proximal end. Bulbous swelling excised, distal end fastened, and nerve sutured. Incision closed and antiseptic dressing applied. Wound healed by first intention, but no recovery in function of nerve occurred.

Bolo wounds.—F. E. F., private, Company I, Fortieth Infantry, United States Volunteers. Transferred to hospital ship *Relief* from post hospital, Cagayan, Mindanao, P. I., April 11, 1900.

Diagnosis on transfer slip: Diagonal incised wound right arm, lower third, outer aspect, 3 inches long, and in depth extending to the bone. Transverse incised wound 3 inches long on left side of neck, having its center 2¾ inches below left ear. Transverse incised wound across dorsum of left scapula 6 inches long and in depth extending to the bone. Diagonal incised wound beginning near posterior termination of preceding and extending downward and forward across posterior termination of axillary fold onto outer aspect of left arm. Length of wound, 8 inches. All these wounds were inflicted by bolos in hands of insurrectos during an attack by them upon the town of Cagayan, Mindanao, P. I., at 5 a.m., April 7, 1900. General condition, good. Wounds nearly healed. Wrist drop and paralysis extensors right forearm.

Operation, April 12, 1900: Wound opened. Long head biceps found severed. Musculo-spiral nerve half severed, bruised, and softened. Injured portion resected, nerve ends sutured with fine silk. Ends of biceps fastened and sutured. Skin sutured. Four days after operation wound found infected; opened, irrigated, and packed with iodoform gauze. Condition May 31: Wound healed by granulation. Extension regained in fingers. Pronation in forearm. No improvement in wrist drop.

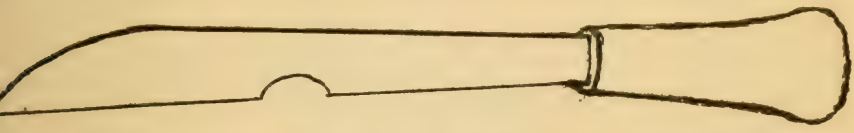
Bolo wound of neck, reported June 1, 1900, by C. F. de Mey, acting assistant surgeon, Bongao, P. I.—Sergeant Egbert V. de Wolfe, Corporal McGatt, Musician William F. Carter, Private Webster F. Gibbons, and Private John Greathouse, all of Company H, Twenty-third Infantry, left this post January 27, 1900, for Lawi-Lawi Island on a hunting pass. On January 29 the party was surprised by a number of hostile Moros armed with parongs or bolos. At the time of the attack Corporal McGatt was bathing in a creek some distance away, and thus escaped harm. The Moros stole upon the others, who were playing cards, from the rear. Sergeant de Wolfe was instantly killed, being almost decapitated at a blow. Private Gibbons died shortly afterwards from his wounds. Musician Carter was wounded in the back, and private Greathouse, the subject of this report, received a dangerous cut in the neck.

His injury was an incised wound of the severest type, so severe, indeed, that his recovery therefrom is little short of marvelous. It extended along the right side of the neck from a point immediately over the axis to a point half an inch from the mental process. The extent and gravity of this wound may be inferred from the following data: It was 7 inches in length by 6 inches in width. It divided the trapezius, sterno-mastoid, platysma, and masseter muscles, severed the occipital and external carotid arteries and external jugular vein, laying bare the axis and internal carotid artery, which vessel only escaped by a fraction of an inch. The facial artery remained uninjured, owing to a defect in the blade of the knife. It will be seen on examining the sketch of the parong, inclosed herewith, that the edge is notched by a curved indentation, a little more than halfway from the point to the handle, in the dullest portion of the blade. The blow must have been a backhanded one, delivered from the right and to the rear of the victim. This brought the indentation opposite the facial artery, over which it formed a bridge on the ramus of the jaw. It tore out a piece of flesh 3½ by ½ inches from the neck. On infliction of the wound the man's head was drawn over onto his left shoulder by the traction of the muscles on that side. In this condition he remained for sixteen hours before I saw him. The only treatment he received was at the hands of Corporal McGatt, the unwounded man.

This consisted in tying a handkerchief, previously soaked in sea water, over the gaping wound. This same corporal brought back the dead and wounded to the post. When the nature of the wound and the injury to the vessels and tissues involved are taken into consideration, together with a rough voyage in an open boat for a distance of 34 miles, it is wonderful the man survived the hemorrhage and shock.

On examination the edges of the wound were found to have shriveled and turned inward, due, no doubt, to the astringent action of the sea water, which is very marked in these parts. The external carotid had retracted within its sheath, but was still bleeding slightly. The ramus of the jaw was fractured from the impact of the parong, and several spiculæ of bone were removed. The wound was packed with antiseptic gauze, drainage inserted, and the edges brought into opposition by eleven stitches. In twenty-four hours examination showed that, owing to long previous exposure, asepsis could not be obtained. Several sutures had torn loose, owing to degeneration of the surrounding tissues. I then decided to abandon the effort to secure union by first intention and let the wound heal by granulation. This it did, with proper attention, in seven weeks.

The recovery of a subject from a wound of this severity has never been paralleled in my experience. He is in the best of bodily health and physical condition at the present time, and is apparently none the worse for his experience, beyond the loss of lateral and rotary motion of the head upon the axis, which will partially return in time.



FILIPINO SANITARY CORPS.

In a report dated June 13, 1900, Maj. Charles F. Mason, surgeon, Twenty-sixth United States Volunteers, gave a brief account of the sanitary corp of the insurrecto army on the island of Panay, as it existed up to November 9, 1899, when our advance from Iloilo disorganized and scattered their troops. The personnel consisted of 1 chief with the rank of lieutenant-colonel, 1 director and 1 subdirector with the rank of major, 4 captains, 10 lieutenants, and 140 litter bearers. Only 2 of the officers (the chief and the director) were medical graduates (medicos titulares); the others were students or practicantes. The equipment was crude, scanty, and improvised. The litter bearers were provided with bags containing a few bandages, dressings, and a paper of iodoform. The litters were improvisations of bamboo, borne each by two bearers; but hammocks also were much used, swung from a bamboo pole on the shoulders of two or four men. There were no wheeled vehicles. Four stations were established at suitable points near their trenches, from which, after first aid had been given, sick and wounded men were sent to the base hospital at Santa Barbara. This hospital occupied several private houses, and was fairly well supplied with cots, medicines, and dressings. The two medical graduates were stationed here. All the members of the sanitary corps served without pay, and, according to Major Mason, their work was exceedingly creditable.

FIELD MANEUVERS OF THE GERMAN ARMY, 1899.

The following report by Dr. John McG. Woodbury, on medico-military conditions in the German army, as seen by him during the

field maneuvers of 1899, is submitted as of interest to our medical officers serving in the field:

BERLIN, *October 1, 1899.*

SIR: I have the honor to report that upon receipt of your commission and instructions, June 25, I sailed for Germany, proceeded to Berlin, and reported at the United States embassy there. The following day I was introduced to the Reichscancellor, Prince Hohenlohe, by his son. This was a social and not a formal embassy presentation. The following day he invited me to dine to meet the surgeon-general of the German army, who detailed an officer of the same rank as my own to accompany me to whatever points of interest I might find in Berlin, especially recommending the inspection of the Kaiser Wilhelm's Academy, the train depot, the Lazareth Elizabeth, the casernes of the First Guard Dragoon Regiment, and the Kaiserin Augusta Regiment No. 4. These I duly visited, after calling formally, in company with Mr. Jackson, our chargé d'affaires, upon the ministry of foreign affairs, and, in company with Captain Allen, upon the ministry for war and the surgeon-general.

My papers, together with the formal application from the State Department to the foreign office of the German Empire for permission to inspect and study the medico-military conditions of the German army in active field maneuvers, being transmitted to the proper authorities, I received word that I should be presented to the Emperor after the parade, September 1, 1899, in the Tempelhoferfeld, and that I should report at the general-kommando of the Sixth Armee Korps, upon the 8th of September, in Breslau.

A mount being provided for me by order of the foreign office at the caserne of the First Dragoon Guard Regiment I rode at the parade, in the Tempelhoferfeld, and at the finish of the review was presented to His Majesty, who received me with great cordiality and kindness, saying that "all medical and sanitary information should be at the disposition of the United States Government."

Upon September the 8th I presented myself at the general kommando of the Sixth Armee Korps, in Breslau, received instructions to proceed at once to the stadsquartier of the Twenty-second Infanterie Brigade, in Schildberg, in Posen. I proceeded at once to Schildberg and reported to General-major and Brigade Kommandeur Graf von der Goltz. I was most heartily received, and, beginning with regimental formation, had opportunity to study in quatier-nothquatier and in bivouac the German army, as represented by the Sixth Armee Korps in active field operations along the Russian frontier. Thus I was permitted to observe and study the methods of feeding commands, and the preparation of food in the companies, with the methods of sleeping the men in bad weather, and to study the relationships existing between the officers and the enlisted force.

From the headquarters of Graf von der Goltz I was transferred to the headquarters of General-major and Divisions Kommandeur Stephani, where I had opportunities to study organization and arrangement for the division; and from there again transferred to the headquarters of the Hereditary Grand Duke of Saxe-Meiningen, commanding the Sixth Armee Korps.

Every opportunity was given me to be present at the various inspections, also, in accompanying the maneuvers, to observe the location of the various dressing stations upon the field of battle; also the methods for transportation and the care of the wounded. This armee korps was fully equipped and the sanitats detachment had the quota of field hospitals, medicine wagons, litters, and bearers.

MEDICAL SERVICE.

The medical service is directly under the medical division of the war ministry, and is presided over by the surgeon-general of the army, who at the present time has the rank of lieutenant-general. The medical corps consists of:

(1) Military doctors with assimilated grades of commissioned officers (sanitats offizier korps).

(2) Military doctors graded as noncommissioned officers (sanitats unteroffiziere).

(3) Nurses, sick bearers, and hospital attendants.

The following are directly subordinated to the surgeon-general: The Kaiser Wilhelm Academie; the examining commission for surgeons; the corps surgeons above major, called general-arzte.

CORPS SURGEONS.

The corps surgeons, colonels or higher, take charge of the corps sanitary service under instructions of the corps commanders and the surgeon-general. In each corps sanitary bureau there is one surgeon with the rank of lieutenant, one corps apothe-

ary, and ordinarily one attached surgeon, with the rank of captain, who is at the head f the microscopic station of hygieno-chemical research. The economic administra-ion is entirely under the corps intendancy.

MEDICAL OFFICERS WITH TROOPS.

1. Each division has a division surgeon with the rank of colonel, who is adviser of he division commander. He conducts sanitary measures within the division, and is hief surgeon of the garrison hospital at division headquarters unless otherwise rovided by order.

2. Each infantry or railway regiment has a regimental surgeon with the rank of ajor or captain, and two battalion surgeons with the rank of captain.

3. Each cavalry regiment has one regimental surgeon with the rank of major or aptain, and most regiments have also one to two surgeons with the rank of lieutenant.

4. Each artillery regiment has one regimental surgeon with the rank of major or aptain, one section surgeon with the rank of captain, and one or two surgeons with he rank of lieutenant.

5. Each foot artillery regiment or independent battalion has one surgeon with the ank of captain; some have also one surgeon with the rank of lieutenant.

6. Many train battalions have each one surgeon with the rank of lieutenant.

Besides the troop surgeons there are various surgeons detailed to garrisons, to ygieno-chemical research stations, and to hygieno-chemical laboratories at certain orps headquarters.

The principal sanitary depot is in Berlin.

Each garrison hospital at corps headquarters has also a sanitary depot and a hospi-al pharmacy. Small hospitals have also medical and surgical stores. Four army orps have convalescent homes.

Medical officers are obtained from military surgical institutions or from graduates f other medical schools, the Kaiser Wilhelm's Akademie being the principal pre-aratory school.

Hospital attendants are taken from the ranks after not less than six months' service nd trained in the lower branches of the sanitary service. After passing the pre-cribed examination they may be employed in hospitals or remain with the troops. ach army corps trains annually from 40 to 50 nurses, and litter bearers as needed.

FIELD MEDICAL SERVICE.

The medical units are: Medicine-wagon detachments, sanitary companies (sani-ats-detachments), field hospitals, etappe hospitals, and war hospitals; the latter may e assigned to divisions. The medicine-wagon detachment—having 4 litters and 2 andage knapsacks, with the necessary personnel taken from the troops—is the mallest unit. This would have one or more surgeons, two or more hospital attend-nts, 16 sick bearers, at the rate of 4 per company, and musicians trained as sick bear-rs. The troop or first dressing stations established by these units are not intended or each separate battalion, but they are combined, and, as a rule, are later submerged nto the chief dressing stations (hochverband platz) of the sanitary company. Half f the sanitary personnel remains with the troops, the other at the dressing stations. his ambulance detachment is nevertheless the unit of the battalion, as far as such unit exists. Every soldier is provided with a dressing package.

The personnel of a sanitary company consists of 8 doctors, 2 captains, 6 lieutenants, hospital attendants, 8 nurses, and 176 sick bearers, corresponding to our field-hospital etail. It is divided into two platoons, and can establish two principal dressing sta-ions. It is provided with 8 two-horse ambulances, 2 sanitary wagons, and 13 ordinary agons, with 56 to 72 litters. Besides these, requisition wagons with straw obtained rom the division intendant or returning provision and train wagons may be used.

The field hospital, of which each army corps has 12, has 200 beds, and is divided nto two platoons. It has 8 surgeons, 2 captains, 6 lieutenants, 9 hospital attendants, 2 nurses, 1 supply wagon, 4 ambulances, 1 sanitary wagon, 5 medicine chests, and litters. Some of the field hospitals are established as near the firing lines as immu-ity from the hostile fire and capture will permit, the others remain with the columns nd trains. Field hospitals are directly under the command of the corps, unless they e assigned to divisions, in which case they are under the division commander.

As the troops advance, the field hospitals that have been installed are turned over o the officials in charge of the line of communications, and thus become etappe hos-itals, or they are converted into permanent war hospitals. Ordinarily one platoon f each field hospital remains behind.

The idea being, however, to maintain the field hospitals as nearly as possible a trictly mobile unit, all sick and wounded are at once sent to the rear and transferred o base hospital by railway, so emptying the field hospital and permitting its organi-ation and equipment to move forward with the advancing line.

The following diagram shows the general system employed from the field of battle to the final destination of the wounded:

Field of battle.	Medicine wagon detachments: Battalion units; first dressing stations.	Severely wounded: field hospitals.	Nontransportable: Permanent field hospitals.	
			Transportable: Sent to etappe hospitals: thence (by auxiliary hospitals and hospital trains)	Home. Reserve hospitals (private). Red Cross hospitals.
	Sanitary companies: Division units; 2 platoons each; principal dressing stations.	Slightly wounded.	Remain with the troops.	
			Directed to an assembly point and marched to etappe hospitals.	

1. The Kaiser Wilhelm's Academy at Berlin.—Place of instruction medical officers; course lasts five years; entrance obtained by examination; average age of student on entrance, 16; earlier courses general; last two years entirely practical hospital service in the hospitals of the various garrisons.

2. Train depot at Berlin.—This contains all the transportation for the First Army Corps; also all the medicine wagons, ambulances, and transportation for field hospitals of the First Army Corps. It is under the charge of an intendant, who is responsible for the property, no medical officer being responsible for any transportation or for any drugs, medical supplies, or equipment until they are issued at hospital. The entire part of this responsibility rests in the train department.

NOTES.—Amount of wagon train and transportation. See special paper of medical service.

Amount of railway transportation and equipment for sick and wounded: Six railway trains of 36 carriages each; the equipment entirely prepared and ready in Berlin; 6 in Breslau and Russian frontier; 6 in Strasbourg.

The commissary and quartermaster's department being responsible for the delivery to the battalion of all food rations and commissary supplies, the necessary transportation for such supplies is attached to the general train and quartermaster's department and not to the regimental transportation.

Caserne des ersten Garde Dragoner Regiment, Caserne der Kaiserin Augusta's Regiment, Caserne des Kronprinz Friederich's Regiment No. 11:

Casernes built of stone: wooden floors, laid on stone and cement; stone and metal stairway; no wood in walls; building fireproof. The newer type is constructed so as to contain quarters for each battalion in a separate building. The cubic air space allowed for sleeping quarters is 15 cubic meters per man; the floor space, 5 square meters per man. The mess room and canteens are in separate buildings from the sleeping quarters, and here the floors are, as a rule, tiled. Cooking is done by steam kettles, and a meat ration is rarely roasted. When so cooked it is prepared by broiling. A subaltern commissioned officer sleeps on the same floor and in front of company command. A subaltern commissioned officer inspects and eats of each meal every day when cooked and ready for issue to the men of his command. The lavatories and baths are in separate buildings, detached from sleeping quarters. Sleeping quarters contain no plumbing. Civilian employees are used as scavengers.

Sinks.—These are always placed in separate house from either sleeping or eating quarters of the men. They are arranged so as to give ample accommodations for each battalion. The commissioned officer is responsible for their sanitary condition, but they are kept clean and in order by civilian employees, who are paid to act as scavengers. They are inspected very frequently every day by first sergeants, and if not in order the scavenger is called to account. Special attention is being paid in the remodeling of old casernes and in the building of new ones to having these sinks properly constructed, thoroughly ventilated and drained.

Sinks in bivouac.—These are trenches dug 4 feet deep, 3 feet wide at the top, 2 feet at the bottom, over which is erected a rail resting on crossed stakes at either end, each man after usage being required to cover his movement with earth. A spade is kept at the sink for this purpose. The seating capacity is 16 places for every 100 men. When the troops move off the ground these trenches are completely filled, and as the same ground is never occupied by troops more than twenty-four hours, no disinfectant is necessary.

NOTE.—A descriptive list, written upon parchment with indelible ink, is sewn inside the inner pocket of the coatee, so that each man carries with him his own descriptive list, which can not be destroyed in any way except by fire.

3. Lazareth Elizabeth.—Excellent military hospital in perfect order. Quality and amount of food equal to our own; preparation better. Each patient has a wine ration. General construction of all base hospitals on pavilion plan.

NOTE.—Tentage is never used in Germany for hospital purposes except in extreme cases of necessity in the first dressing station or brigade section of field hospital; soldiers are at once quartered in requisitioned buildings; this is a general policy. The pavilions built of brick, 2 stories in height, fireproof. All sinks and lavatories separated by a double partition. Operating theater of glass and marble, in separate buildings, connected by a cloister corridor.

Organization.—Surgeon in command, rank of lieutenant-colonel; two assistant surgeons, rank of captain; internes, students from the Kaiser Wilhelm Akademie; hospital orderlies, men of third year's service desirous of entering sanitary corps. Here instruction is given to those soldiers of the sanitary corps desirous of becoming Lazareth's helfer—our hospital steward.

Clothing.—The underclothing consists of socks or fusslappen, and these must be provided by the soldier himself. He may wear either he likes, using his own discretion.

NOTE.—Fusslappen: These are made of linen, canton flannel, or knitted woolen material, varying with the temperature and moisture of the feet. They are about 4 inches wide by 18 inches long and are put on by being wrapped about the foot, starting one end smoothly under the ball of the great toe and winding like a bandage over the back of the foot from within outward, finally covering the heel, and the last corner being laid smoothly across the instep. The stockings are of the ordinary cotton or woolen manufacture.

The drawers are of canton flannel of a good quality, the shirt of flannel mixed with cotton. A new issue which is to be made will make this shirt a knitted one. The trousers, of a coarse woolen material, are cut fairly loose. The coatee, a short frock in cut, is single-breasted and also of wool. The overcoat is long, without a cape, with a collar which may be turned up and held in place by a little hood, which is concealed in a pocket in the collar; in extreme cold weather or rain can be put on underneath the leather helmet. This helmet is admirably adapted for shelter from sun and rain, the lip behind keeping the wet out of the back of the men's necks. The boots are of leather, the new issue being fair leather, are strong, heavy, and dressed only with grease. On a march trousers are always worn in them, the leg of the boot forming an excellent legging. The shoes are of leather, with canvas upper part where the lacing comes, and are only used indoors or upon fatigue service, the boot being always worn on duty.

Each man has a brown linen fatigue suit, trousers cut loose, jacket cut Eton style, but buttoned tight to the throat. This is of heavy drab-brown linen, about the weight of No. 6 canvas. All buttons are of solid metal; no hollow buttons, as in our service. Each man has a small fatigue cap, without peak or visor. This clothing is never varied, either winter or summer.

Bedding.—In barracks the beds are ticks of canvas filled with straw upon a canvas tightly stretched in an iron frame. Each man is allowed one blanket, lighter in color than ours and not as good in quality, two sheets of coarse linen, a pillow stuffed with hair, and a pillowcase.

In the field the men sleep upon straw obtained by requisition.

Food.—The quantity is sufficient, being half a pound of meat per day per man; a pound of fresh vegetables, potatoes, onions, beans, etc.; a ration of split peas or beans for soup, and 2 ounces of coffee, chocolate, or cocoa.

NOTES.—The quality is excellent.

All fresh meat is inspected by the regimental medical officer before issue, and he is responsible for its condition.

In barracks all food is prepared in kitchens separate from the sleeping quarters and cooked in steam kettles and boilers, usually in the form of stew and thick soup. The bread is heavy rye, raised with yeast, no hard bread being issued except in emergency. The ration is never varied in winter or summer, but I understand that it is varied in the German colonies in Africa and elsewhere by a further addition of rice and green vegetables. For quantities and description of difference between garrison and field ration see Major Allen's report. The constituents and character of the emergency field ration consists of 2 pounds of hard bread, 1-pound tin of preserved meat, 1-pound tin of preserved peas. (N. B.—These preserved peas contain considerable lard.) All issues are made from the intendant's bureau and brought directly to the battalion.

Field cooking arrangements.—Each man carries his own, consisting of a tin, rather oval in its short diameter. In this his provisions are carried, and when the top or lid is removed the bottom can be used as a kettle and the top as a coffeepot. In the field, usually, two men mess together, one making soup in the bottom of his pail, while the other makes coffee in the bottom of his, the tops being used as plates. There are no scraps, and there is no waste.

Equipment.—Cooking tin or provision canister carried on top of the knapsack, about 10 inches long by 4 wide by 3 in its short diameter. This is made of aluminum in the new equipment.

Canteen or water bottle: old equipment made of glass covered with leather; new equipment made of aluminum covered with leather; holds one quart.

NOTE.—No haversack.

Knapsack made of horsehide with the hair on, waterproof; contents, 1 pair of shoes, two extra pair of socks or fusslappen, brown linen fatigue suit, shaving materials, soap and towel, needles, thread, a lump of tallow, 50 rounds of ammunition, a pound of bread, and what conserves he may have issued to him. The overcoat with the shelter tent, which latter resembles ours, save that it is brown in color, is rolled and made over the edges of the knapsack. No blanket roll slung from shoulder to hip is allowed. Every second man carries a spade or mattock, while two men in each company carry folding canvas buckets.

NOTE.—Total weight of each man's equipment, pack, and piece, 60 pounds.

Cartridge boxes of leather, two in front and one behind. No cartridge belts used.

Medical department.—General management of permanent military hospitals—organization and equipment same as civil hospitals.

Organization.—Officer with the rank of lieutenant-colonel, medical department, in command. Detail of two assistants of rank of captain. A superintendent has entire charge and responsibility for all medical stores; also of all food and clothing, receives the same and issues it, superintends kitchen and inspects food, and does generally the work of quartermaster and commissary combined. This intendant would correspond to superintendent of a hospital in civil life; is always a civilian, and has no rank as an officer. The furniture, instruments, and medical and surgical equipment are all of the very best and newest type. Beds, bedding, and clothing for the sick are excellent in quality.

Dietary.—There are three grades of sick ration issued—for the very sick, special diets; for those not so ill, a soup or stew, like heavy broth, containing meat with rice and vegetables; for convalescents, strong supporting diet of roast or baked meats with potatoes, onions, etc. There is an issue of claret for medium sick and convalescents equivalent to half a pint of Burgundy or of heavy Bordeaux twice daily; for the very ill spirits may be obtained, but only on doctor's order.

NOTES.—It seems to be the policy in the management of these permanent military hospitals to divorce the medical officer from all property responsibility and confine his duties entirely to the medical and surgical care of his cases; in other words, the medical officer is a doctor or a surgeon, the superintendent having all other responsibilities.

There is no such thing as a sick call in the German army. If an enlisted man falls ill or seems to be unfit for duty it is reported to the first sergeant of his company; if on inspection the first sergeant finds the man to be in need of medical care, if the case be in the barracks, he is retained in quarters until the medical officer makes his daily round, morning or afternoon; if in the field, he is picked up by the lazareths helfer and taken to the field hospital. The record is kept by the first sergeant, and the man continues to be borne on the company's strength, but as off duty. When he is returned he is simply marked for duty on the company's books; the time that he has been away is stated as "in hospital."

Field service.—Transportation of sick. The sick or wounded are carried from the firing line, where they receive their first dressing, to the "Hauptverbandplatz" by a corps of litter bearers; from there to the field hospital by ambulance, requisitioned wagons, or whatever transportation can be got. From the field hospital they are immediately forwarded to the base hospital by railway.

NOTE.—As all field hospitals are regarded accurately as field hospitals and never as permanent hospitals, every case that can be moved by any possibility is sent to the rear or to a base hospital within six hours, the field hospital being regarded as an entirely mobile unit. When the line in action advances the field hospital must advance with it; consequently it is regarded only as a resting place in which better dressings can be applied and only simple operations, which are immediately necessary, performed.

The German ambulance somewhat resembles our Greenleaf model, being slightly heavier, and carries four inside, two outside, beside driver, so arranged as to receive the field stretchers, which are all of one model and all the same size. Four of these stretchers, each bearing a wounded man, can be pushed into the after end of the ambulance, two on the bottom and two on steel tracks above.

NOTE.—Ambulance built with a perch so as to permit four wheels to turn almost at right angles.

Litters.—Wooden frame, iron ends to keep the two wooden poles rigidly apart, canvas slung between; these are light, strong, and not destructible, so arranged that if necessary the patient can be taken directly from the field upon the litters. It forms a bed for him in the hospital and, if desired, also a berth for him in the train for wounded.

Field hospitals.—Tentage is small in amount, requisition to quarters in the nearest village being always used. The Germans have a saying that "their worst quarters are better than the best bivouac," so they never use canvas when they can get the tight roof of a house. Their canvas is linen, heavier than ours, wall tent in shape, and about the size of ours. Each hospital tent is provided with a double fly; also with poles to every second seam at the side. These are all very strongly guyed to large pegs or stakes that are shod with iron, and have an iron band at the top to keep them from spreading. There are no cots with field-hospital equipment. The cases are cared for on canvas stretchers or straw. Blankets, nightshirts, etc., are furnished. Commodes, tables, washstands, pans, spit cups, etc., are generally of metal, a great deal of enameled ware being used. Cooking and messing arrangements are entirely in charge of the intendant, the medical officer not having this responsibility. The cooking is in kettle, and the same dietary is attempted as for the sick and very sick in general hospital.

First aid to the wounded.—Exactly the same as with us, the first-aid packet being almost identical. Each company has with it on the firing line the first-aid packets in the pockets of the men, these men having been previously instructed by the lazareth's helfer in methods of application. This instruction is given by a medical officer to the lazareth's helfers.

NOTE.—Lazareth's helfer about the equivalent of our hospital steward or sergeant.

These lazareth's helfers instruct the enlisted men, there being one with every company.

Medical chests, panniers, and other field appliances.—The medical chests are identical with our own. Sterilizing apparatus, bandage packages, dressings, orderly pouches, greatly resemble our own models. The "medicine wagon" which accompanies each regiment is four-wheeled, front wheels cut under to turn at right angle, two men outside, opens in the rear with two doors, contents stored in drawers and lockers.

Contents.—Surgical instruments enough for operation, full supply of medicines for a regiment of 3,000 men, dressings, bandages, gauze, sterilizing apparatus, a small biological laboratory for making cultures, etc., apparatus for examination of water, scales and weights for dispensing outfit; in fact, is a compact, thoroughly equipped apothecary shop and surgery.

Disinfectants.—These are only used in hospital, not in barracks. As there are no sinks in barracks and no plumbing of any sort connected with the sleeping quarters, no disinfectants are used, and the sinks are kept clean by scrubbing and thorough flushing with water, hired civilian scavengers doing the work. In the field, as no command is ever kept more than one day on the same ground, no disinfectant is here necessary, everything being buried and burned.

Sanitary rules and regulations.—All regulations regarding light, air, clothing, bedding, water, and bathing facilities originate in the staff department in Berlin, and are carried out by the captains of the companies. There is a saying of a company, "The captain is the father and the first sergeant is the mother." This will explain that the line officer looks after his men and sees to their personal cleanliness.

Sanitary appliances.—Water is not boiled and is not filtered, but all water before being used at any barrack is carefully analyzed by the medical officer, and when troops are to be quartered in a town the water of that town is examined before the troops are sent there. There are no disinfectant arrangements for sinks, except cleanliness and discipline; they are never in disorder. In barracks all garbage, grease, and whatever scraps may come from the ration are carefully collected in large covered barrels and sold, the purchaser removing the same twice a day. In the field all refuse about a bivouac is carefully collected and burned.

Foot inspection.—The feet of the army are most carefully considered, each man's feet being inspected by one of his company officers, a medical officer, and the lazareth helfer at least twice a week in barracks, and oftener in active field maneuvers. The method of making this inspection is to form the companies in squads, standing upon tables or benches sufficiently high to bring the feet directly under the eye of the inspecting officer, and to bring under his observation any wincing or flinching when the inspected man jumps to the ground barefooted. The inspecting officer passes down the line carefully examining the front of the feet and legs which are bared to the knees, searching for strained tendons, blisters, improperly cut nails, or untrimmed corns.

Having passed down the line, the men are about faced and the tendo-achilles carefully examined, and as they raise one foot and then the other the soles are inspected. As a man passes from the table or bench he leaps to the ground and runs to his shoes and stockings. This is to show any bruised soles or periostitis of the tarsus. Any case of blisters, improperly cut nails, or teno-synovitis are at once cared for by the lazereth helfer. More serious disorders are sent to quarters or hospital.

At the same time each man's socks or fusslappen and boots are carefully inspected as to the condition of cleanliness. As the infantry regiments average in marching a kilometer in ten minutes, being often pressed to a kilometer in from seven and a half to eight minutes, each man carrying 60 pounds, this care of feet is most necessary. When tables or benches are not available, the trunk of a fallen tree or a block of stone are made use of.

Body inspection.—The entire body of every man is inspected every thirty days by a company officer and a medical officer, careful search being made for any heart lesions, hernia, venereal disorders, skin diseases, eczemas, etc. This is in order that any physical defect may be carefully noted, cared for, and reported that might be concealed by clothing or the improper modesty or willfulness of the enlisted man.

Bivouac.—In bivouac the arrangement differs materially from our own. The German soldier and officer being provided only with a shelter tent, each man carries his own cover. The formation is by companies, by regiments, by brigades, much as our own. Ground is never occupied by troops more than twenty-four consecutive hours, fresh ground or bivouac always being found. Usually two men arrange to tent together. This being done, the one with the spade digs a trench 7 feet long by 4 feet wide, 6 inches to a foot deep. As ground for bivouac is always selected on the gentle slope of the hill, the foot of these "grabungs" is usually at the surface while the head is considerably deeper.

The shelter tent is erected and spread out over the earth thrown upon each side and at the head, while the "grabungs" are filled in with straw, requisitioned from the nearest stack, one bundle being allowed to each man. The reason for this ditching and walling of the side of the tent is to keep out rain, water, and the cold wind. In fine weather or summer the shelter tent is never erected, the men sleeping upon it and their overcoats. Officers to the rank of colonel are tented in the same way as the men, there being no discrimination made. Colonels of regiments and general officers have, however, a fly about the size of our three-seam wall canvas. The officers' mess is prepared by their servants, with approximate simplicity to that of the men.

NOTES.—I must call attention to the new bakery wagon that was tried this year for the first time in active field maneuvers of the German army. It is a wagon with 4 wheels, 10 feet long, drawn by 4 horses. The body consists of a furnace arranged for a wood fire, over which is a corrugated sheet-iron oven, the heat from which is prevented from radiating by a packing between the two skins. This is so efficient that the outside of the oven will bear the touching of the hand without burning. In front is arranged a tank for the heating of water, used in the mixing of dough, which mixing is done in a following wagon, where the loaves are shaped, placed upon boards, and prepared for the oven. The capacity of these ovens is eighty loaves baked ready for issue every hour and a half, at a speed upon the chausee of a kilometer in ten minutes.

The general effect of one of these wagons is that of an oval iron tank resting upon its short diameter, a smokestack at the forward upper end, a water tank in front, with stopcocks for drawing, fire box and doors at after end below, and doors for oven above. For fuller description, with drawing, I would respectfully call attention to the report of Major Allen, military attaché in Berlin. This mobile bread bakery has been tried with great success, and upon good roads in not too difficult country appears to give most excellent results. The old fixed oven buried in sand had a capacity of one hundred loaves every hour and a half, but the necessity for transportation from the fixed oven to troops moving renders the oven upon wheels a matter much in discussion.

I would respectfully call attention to the accompanying photographs of the new wheeled stretcher made of bent wood and for service with possibly one bearer. This was shown in the tempelhoferfeld on July 28, and met with approving comment from the surgeon-general and other medical officers of the German army. It is extremely light, and being made of wood, steamed and bent, it is less liable to damage than stretchers made of several pieces.

One bearer is able to transport with this machine over good ground as much as two bearers with the former modern stretcher.

I have been greatly aided in my work of studying and reporting upon the medico-military conditions of the German army in active field maneuvers by the able and courteous assistance of Major Allen, our military attaché in Berlin; also by the executive ability of Mr. Jackson, our chargé d'affaires at the court of the German Empire.

Very respectfully,

JOHN MCG. WOODBURY, A. M., M. D., M. R. C. S.,
United States Commissioner, late Major and Chief Surgeon, U. S. V.

HON. SECRETARY OF STATE OF THE UNITED STATES.

COMMENDATIONS

With few exceptions the medical officers of our Army, both regulars and volunteers, have performed the responsible duties devolving upon them in a manner most creditable to themselves and to the service. During the calendar year 1900 Col. Charles H. Alden, assistant surgeon-general, was the senior assistant in my office. He had special charge of the supply division, and by virtue of his rank became acting surgeon-general when I was absent from the office. He was continuously upon duty in my office from August 31, 1893, until April 28, 1900, when he was retired for age. His services have been most valuable not only as principal assistant in the office of the Surgeon-General, but as president of the Army Medical School from the time of its organization until the course of instruction was suspended because of the emergencies resulting from the war with Spain. Lieut. Col. Charles Smart, deputy surgeon-general, who for many years has had charge of the sanitary and disbursing division of the Surgeon-General's Office, has, as usual, performed the important duties devolving upon him with intelligence and zeal. Maj. George E. Bushnell, surgeon in charge of the Hospital Corps division, has distinguished himself by his conscientious and intelligent attention to the interests of this important branch of the service.

Mr. George A. Jones, chief clerk, has continued to exhibit a degree of efficiency and attention to the responsible duties attached to his position which is, I believe, unsurpassed in the Government service. Through his efforts and those of the principal clerks in the several divisions of my office the work has been continuously kept up to date and has been conducted in a most systematic and thorough manner.

Among the medical officers of the Army occupying especially responsible positions the following are deserving of mention as having distinguished themselves for efficient and zealous performance of duty:

Col. Charles R. Greenleaf, assistant surgeon-general, for valuable services in the inspection and sanitary supervision of camps occupied by our volunteer troops at Savannah, Ga., Camp Meade, Pa., and the Presidio of San Francisco, Cal. (at present chief surgeon, Division of the Philippines).

Col. William H. Forwood, assistant surgeon-general, chief surgeon Department of California, whose responsibilities have been very great on account of the number of troops which have arrived at San Francisco en route to the Philippines and the number of sick returning from those islands.

Col. A. A. Woodhull, assistant surgeon-general, chief surgeon Division of the Philippines from April 18, 1899, to December 23, 1899.

Lieut. Col. Henry Lippincott, deputy surgeon-general, chief surgeon Division of the Philippines from June 26, 1898, to April 18, 1899.

Lieut. Col. A. C. Girard, deputy surgeon-general, in command of the United States general hospital, Presidio, San Francisco, Cal.

Lieut. Col. R. M. O'Reilly, deputy surgeon-general, chief surgeon Division of Cuba from January 25, 1899, to November 12, 1899.

Maj. Valery Havard, surgeon, chief surgeon, Department of Santiago, Cuba, from August 17, 1898, to April 18, 1900. (At present chief surgeon, Division of Cuba.)

Maj. John Van R Hoff, surgeon, chief surgeon Department of Porto Rico.

A mention of all of the medical officers whose services are worthy of commendation would include the names of nearly all of those belonging to the regular establishment and a considerable proportion of those serving under volunteer commissions. Nor can I omit in this connection the acting assistant surgeons, who, as a rule, are young men well equipped for the professional work they are called upon to perform, and many of whom have distinguished themselves by the zeal and intelligence with which they have performed their duties under the most trying conditions of active field service in the Philippines.

STATISTICAL TABLES.

The following tables give in detail the statistical data on which the statements of this report are based:

I. Numerical view of the effects of disease and injury on the armies, regular and volunteer, during the calendar year 1898, as compared with the corresponding data for the Regular Army in 1897, and during the decade 1887–1896.

II. Numerical view of the effects of disease and injury on the Regular Army during the calendar year 1899, as compared with the corresponding data of the Regular Army for 1898, and for the decade 1888–1897.

III. Numerical view of the effects of disease and injury on the armies, regular and volunteer, during the calendar year 1899, as compared with the corresponding data for the armies in 1898 and for the Regular Army during the decade 1888–1897.

IV. Volunteer Army, 1898.
V. Volunteer Army, 1899.
VI and VII. Regular and Volunteer armies, 1899.

Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by arms of the service and countries in which service was rendered.

VIII. Armies, regular and volunteer, 1898 and 1899. Admissions to sick report, discharges and deaths from various causes, with their ratios per thousand of mean strength, as compared with the corresponding ratios of the Regular Army during the decade 1888–1897.

IX. Number of white and colored applicants for enlistment examined physically during the year 1899, with the number accepted, rejected, and declined, and ratios per thousand.

X. Nativity of white and colored recruits accepted during the year, with ratios per thousand of accepted men.

XI. Causes of rejection among 70,311 candidates for enlistment examined during the year, with ratios per thousand examined.

International tables I, III, VI, and VII.

[It has not been practicable during the past year to gather the information necessary for the presentation of Tables II, IV, V, and VIII of the international series.]

TABLE I.—*Numerical view of the effects of disease and injury on the armies, regular and volunteer, during the calendar year 1898, as compared with the corresponding data for the Regular Army in 1897, and during the decade 1887–1896.*

Total Army for the year 1898.	Cuba.	Porto Rico.	Pacific islands.	Total islands.	United States.	Total Army.	White.	Colored.
Mean strength	8,345	5,693	9,907	23,945	123,261	147,795	140,395	7,400
Total admissions to sick report	28,486	14,655	18,843	61,984	254,265	317,195	301,226	15,969
Per 1,000 of mean strength	3,413.54	2,574.21	1,901.99	2,588.6	2,062.82	2,146.18	2,145.56	2,157.97
Per 1,000 for previous year						1,186.61	1,189.84	1,248.61
Per 1,000 for preceding decade						1,243.39	1,243.02	1,262.38
Admissions for disease	26,271	13,933	17,602	57,806	237,759	296,148	284,766	14,682
Per 1,000 of mean strength	3,148.11	2,447.39	1,776.72	2,414.12	1,928.91	2,005.80	2,006.95	1,984.05
Per 1,000 for previous year						896.53	890.77	958.41
Per 1,000 for preceding decade						986.23	989.27	964.84
Admissions for injury	2,215	722	1,241	4,178	16,506	20,747	19,460	1,287
Per 1,000 of mean strength	265.43	126.82	125.26	174.48	133.91	140.38	138.61	173.92
Per 1,000 for previous year						290.08	290.07	290.20
Per 1,000 for preceding decade						257.16	256.74	287.54
Discharges for disability, all causes	46	32	170	284	1,789	2,088	1,995	93
Per 1,000 of mean strength	5.51	5.62	17.16	10.36	14.51	14.13	14.21	12.57
Per 1,000 for previous year						9.61	9.62	9.51
Per 1,000 for preceding decade						18.32	18.24	18.62
Discharges for disease	37	25	149	211	1,462	1,662	1,590	72
Per 1,000 of mean strength	4.43	4.39	15.04	8.81	11.37	11.25	11.33	9.73
Per 1,000 for previous year						7.60	7.59	7.70
Per 1,000 for preceding decade						15.07	14.97	15.40
Discharges for injury	9	7	21	37	387	426	405	21
Per 1,000 of mean strength	1.08	1.23	2.12	1.55	3.14	2.88	2.88	2.84
Per 1,000 for previous year						2.01	2.03	1.81
Per 1,000 for preceding decade						3.25	3.26	3.22
Deaths from all causes	764	276	239	1,279	2,846	4,126	3,937	199
Per 1,000 of mean strength	91.55	48.48	24.12	53.41	23.09	27.99	28.05	26.89
Per 1,000 for previous year						5.11	5.05	5.89
Per 1,000 for preceding decade						6.99	6.76	8.46
Deaths from disease	567	262	203	1,032	2,649	3,690	3,529	161
Per 1,000 of mean strength	67.94	46.02	20.49	43.10	21.49	24.97	25.14	21.76
Per 1,000 for previous year						3.14	3.18	2.72
Per 1,000 for preceding decade						4.77	4.59	6.09
Deaths from injury	197	14	36	247	197	446	408	38
Per 1,000 of mean strength	23.61	2.46	3.63	10.31	1.60	3.02	2.91	5.13
Per 1,000 for previous year						1.97	1.87	3.17
Per 1,000 for preceding decade						2.22	2.17	2.37

TABLE II.—*Numerical view of the effects of disease and injury on the Regular Army during the calendar year 1899, as compared with the corresponding data of the Regular Army for 1898, and for the decade 1888–1897.*

Total Regular Army for the year 1899.	Cuba.	Porto Rico.	Pacific islands.	Total islands.	United States.	Total Army.
Mean strength	11,969	3,347	22,922	38,238	26,208	64,446
Total admissions to sick report	35,401	8,797	60,306	104,504	46,445	150,949
Per 1,000 of mean strength	2,957.73	2,628.33	2,630.92	2,732.99	1,772.17	2,342.26
Per 1,000 for previous year	2,631.76	3,350.78	2,070.62	2,603.84	2,043.01	2,416.94
Per 1,000 for preceding decade					1,130.27	1,130.27
Admissions for disease	32,206	7,875	56,253	96,334	40,661	136,995
Per 1,000 of mean strength	2,690.79	2,352.85	2,454.10	2,519.33	1,551.47	2,125.74
Per 1,000 for previous year	2,230.18	3,204.66	1,914.23	2,341.66	1,845.81	1,957.71
Per 1,000 for preceding decade					891.70	891.70
Admissions for injury	3,195	922	1,053	8,170	5,784	13,954
Per 1,000 of mean strength	266.91	275.48	176.82	213.66	220.70	216.52
Per 1,000 for previous year	401.57	146.11	156.39	262.18	197.20	209.23
Per 1,000 for preceding decade					238.57	238.57
Number constantly noneffective	922	245	1,978	3,145	1,573	4,718
Per 1,000 of mean strength	77.04	81.27	86.29	82.25	60.05	73.22
Per 1,000 for previous year					82.83	82.83
Per 1,000 for preceding decade						
Days lost on account of sickness	336,539	89,263	722,015	1,147,817	574,389	1,722,206
For each man of Army	28.1	26.7	31.5	30	21.9	26.7
For each man, previous year						30.23
For each man, preceding decade						
Average days each case was treated	9.5	10.1	12	10.8	12.4	11.4
For previous year						14.08
For preceding decade						
Discharges for disability, all causes	305	72	456	833	934	1,767
Per 1,000 of mean strength	25.48	21.51	19.89	21.79	35.64	27.42
Per 1,000 for previous year		6.74	11.37	5.32	13	11.58
Per 1,000 for preceding decade					16.57	16.57
Discharges for disease	234	61	327	622	773	1,395
Per 1,000 of mean strength	19.55	18.22	14.26	16.26	29.50	21.65
Per 1,000 for previous year		4.15	10.68	4.51	8.05	7.40
Per 1,000 for preceding decade					13.47	13.47
Discharges for injury	71	11	129	211	161	372
Per 1,000 of mean strength	5.93	3.29	5.63	5.52	6.14	5.77
Per 1,000 for previous year		2.59	.69	.81	4.95	4.18
Per 1,000 for preceding decade					3.09	3.09
Deaths from all causes	234	38	713	985	217	1,202
Per 1,000 of mean strength	19.55	11.35	31.10	25.76	8.28	18.65
Per 1,000 for previous year	98.16	11.15	22.74	60.17	20.14	27.55
Per 1,000 for preceding decade					6.69	6.69

Deaths from disease	207	31	408	646	176	822						
Per 1,000 of mean strength	17.29	9.26	17.80	16.89	6.72	12.75						
Per 1,000 for previous year	61.15	39.38	18.60	12.01	17.45	22.50						
Per 1,000 for preceding decade					4.30	4.50						
Deaths from injury	27	7	305	339	41	380						
Per 1,000 of mean strength	2.26	2.09	13.30	8.87	1.56	5.90						
Per 1,000 for previous year	37.01	2.07	4.13	18.16	2.09	5.63						
Per 1,000 for preceding decade					2.19	2.19						

TABLE III.—*Numerical view of the effects of disease and injury on the armies, regular and volunteer, during the calendar year 1899, as compared with the corresponding data for the armies in 1898 and for the Regular Army during the decade 1888–1897.*

Total Army for the year 1899.	Cuba.	Porto Rico.	Pacific islands.	Total islands.	United States.	Total Army.	White.	Colored.
Mean strength	20,051	3,727	39,280	63,058	42,192	105,546	98,635	6,911
Total admissions to sick report	55,135	9,401	94,096	158,632	70,778	229,885	214,578	15,307
Per 1,000 of mean strength	2,749.74	2,522.40	2,395.52	2,515.65	1,677.51	2,178.06	2,175.47	2,214.88
Per 1,000 for previous year	3,413.54	2,574.21	1,901.99	2,588.60	2,062.82	2,146.18	2,145.56	2,157.97
Per 1,000 for preceding decade						1,130.27	1,128.55	1,149.76
Admissions for disease	50,889	8,108	86,666	145,963	63,155	209,570	195,941	13,629
Per 1,000 of mean strength	2,537.98	2,255.97	2,206.56	2,314.74	1,496.84	1,985.58	1,986.51	1,972.08
Per 1,000 for previous year	3,148.11	2,447.39	1,776.72	2,414.12	1,928.91	2,005.80	2,006.95	1,981.05
Per 1,000 for preceding decade						891.70	892.94	884.42
Admissions for injury	4,246	993	7,430	12,669	7,623	20,315	18,637	1,678
Per 1,000 of mean strength	211.76	266.43	189.16	200.91	180.67	192.48	188.95	242.80
Per 1,000 for previous year	265.43	126.82	125.26	174.48	133.91	140.38	138.61	173.92
Per 1,000 for preceding decade						238.57	235.61	265.35
Discharges for disability, all causes	406	74	700	1,180	1,137	2,320	2,168	152
Per 1,000 of mean strength	20.25	19.85	17.82	18.71	26.95	21.98	21.98	21.99
Per 1,000 for previous year	5.51	5.62	17.16	10.36	14.51	14.13	14.21	12.57
Per 1,000 for preceding decade						16.57	16.52	16.40
Discharges for disease	326	62	517	905	940	1,848	1,726	122
Per 1,000 of mean strength	16.26	16.63	13.16	14.35	22.28	17.51	17.50	17.65
Per 1,000 for previous year	4.43	4.39	15.01	8.81	11.37	11.25	11.33	9.73
Per 1,000 for preceding decade						13.47	13.42	13.32
Discharges for injury	80	12	183	275	197	472	442	30
Per 1,000 of mean strength	3.99	3.22	4.66	4.36	4.67	4.47	4.48	4.34
Per 1,000 for previous year	1.08	1.23	2.12	1.55	3.14	2.88	2.88	2.84
Per 1,000 for preceding decade						3.09	3.10	3.07
Deaths from all causes	367	42	1,201	1,610	333	1,945	1,830	115
Per 1,000 of mean strength	18.30	11.27	30.58	25.53	7.89	18.43	18.55	16.64
Per 1,000 for previous year	91.55	48.48	21.12	53.41	23.09	27.99	28.05	26.89
Per 1,000 for preceding decade						6.69	6.47	7.98
Deaths from disease	328	31	601	963	277	1,241	1,169	72
Per 1,000 of mean strength	16.36	9.12	15.30	15.27	6.56	11.76	11.85	10.42
Per 1,000 for previous year	67.94	46.02	20.49	43.10	21.49	24.97	25.14	21.76
Per 1,000 for preceding decade						4.50	4.34	5.59
Deaths from injury	39	8	600	647	56	704	661	43
Per 1,000 of mean strength	1.94	2.15	15.28	10.26	1.33	6.67	6.70	6.22
Per 1,000 for previous year	23.61	2.46	3.63	10.31	1.60	3.02	2.91	5.13
Per 1,000 for preceding decade						2.19	2.13	2.39

TABLE IV.—*Volunteer Army, 1898.—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by arms of the service and countries in which service was rendered.*

	Cavalry.						Artillery.						Infantry.					
Mean strength	2,750.						2,573.						93,744.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	1	0.36					1	0.39			1	0.39	33	0.35			3	0.03
Measles	106	38.55			1	0.36	44	17.10					6,058	64.62	7	0.07	57	.61
Smallpox							1	.39			1	.39	68	.73			15	.16
Vaccinia	241	87.63					158	61.41					3,501	37.35	1	.01		
Influenza	8	2.91					173	67.24					2,471	26.36	1	.01		
Dengue	15	5.45					3	1.17					175	1.87			2	.02
Mumps	20	7.27					27	10.49					1,811	19.32	2	.02		
Diphtheria													42	.45			1	.01
Typhoid fever	538	195.63	1	0.36	53	19.27	162	62.96			18	7	15,794	168.48	23	.23	1,645	17.55
Yellow fever	27	9.82			2	.73							532	5.67			71	.76
Cerebro-spinal fever	6	2.18			3	1.09	1	.39					99	1.06	3	.03	62	.66
Malarial fever, intermittent	1,231	447.64					569	221.14					36,890	393.50	1	.01		
Malarial fever, remittent	447	162.55	6	2.18	3	1.07	101	39.26			1	.39	16,404	174.98	16	.17	69	.74
Malarial fever, pernicious							1	.39			1	.39	201	2.14	5	.05	103	1.10
Malarial cachexia	41	14.91	1	.36			5	1.94					1,060	11.31	17	.18	16	.17
Fever, undetermined	188	68.36					25	9.72					2,721	29.02			1	.01
Erysipelas							2	.78					58	.62				
Septicæmia and tetanus													18	.19			14	.15
Rheumatic fever	4	1.45					6	2.33					328	3.50	8	.09		
Consumption	17	6.18	9	3.27	1	.36	5	1.94	2	.78			389	4.15	107	1.14	23	.25
Cancer													13	.14	1	.01	2	.02
Syphilis and results	32	11.64	5	1.82			35	13.60	2	.78			972	10.37	90	.96	1	.01
Gonorrhœa and results	209	76.01					216	83.95	1	.39			4,768	50.86	44	.47	1	.01
Chancroid and results	41	14.91					42	16.32					1,978	21.10	10	.11		
Infections, others	2	.73					1	.39					335	3.57	1	.01		
Total infectious diseases	3,174	1,154.18	22	7.99	63	22.88	1,578	613.30	5	1.95	22	8.56	96,719	1,031.74	340	3.60	2,086	22.26
Anæmia	9	3.27	1	.36			8	3.11					324	3.46	3	.03		
Nutrition, others	13	4.73	6	2.18			5	1.94					489	5.22	14	.15	3	.03
Total diseases of nutrition	22	8	7	2.54			13	5.05					813	8.68	17	.18	3	.03
Alcoholism	3	1.09					20	7.77					516	5.49	25	.27	14	.15
Brain and spinal cord	14	5.09	3	1.09			18	7	1	.39			537	5.73	66	.70	29	.31

TABLE IV.—*Volunteer Army, 1898.—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by arms of the service and countries in which service was rendered*—Continued.

	Cavalry.						Artillery.						Infantry.					
Mean strength	2,750.						2,573.						93,744.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Insanity	3	1.09	3	1.09	.....	.....	2	0.78	2	0.78	.....	.....	94	1	49	0.52	2	0.02
Meningitis	.....	.....	.....	.....	.....	.....	1	.39	.....	.....	1	.39	53	.57	.....	.....	24	.26
Poisoning, narcotic	.....	.....	.....	.....	.....	.....	3	1.17	2	.78	.....	.....	45	.48	5	.05	3	.03
Nervous system, others	108	39.27	1	.36	.....	.....	60	23.32	3	1.17	.....	.....	2,324	24.79	30	.32	2	.02
Total diseases of the nervous system	128	46.54	7	2.54	.....	.....	104	40.43	8	3.12	1	.39	3,569	37.97	175	1.86	74	.79
Poisoning, irritant	14	5.09	.....	.....	1	.36	7	2.72	.....	.....	.....	.....	223	2.38	1	.01	8	.09
Tonsilitis, pharyngitis, and sore throat	51	18.55	.....	.....	.....	.....	90	34.98	.....	.....	.....	.....	2,858	30.27	1	.01	1	.01
Peritonitis	1	.36	.....	.....	1	.36	1	.39	.....	.....	.....	.....	70	.75	.....	.....	21	.22
Dyspepsia, colic, and constipation	379	137.82	.....	.....	.....	.....	214	83.17	.....	.....	.....	.....	8,571	91.43	21	.22	3	.03
Gastritis	111	40.36	.....	.....	1	.36	39	15.16	1	.39	.....	.....	2,049	21.86	7	.07	3	.03
Diarrheal diseases	2,341	851.27	5	1.82	2	.73	1,185	460.55	2	.78	.....	.....	38,820	411.10	46	.49	111	1.18
Enteritis	109	39.63	.....	.....	.....	.....	43	16.71	.....	.....	.....	.....	2,397	25.57	4	.04	16	.17
Perityphlitis and appendicitis	8	2.91	.....	.....	2	.73	6	2.33	1	.39	.....	.....	236	2.52	9	.10	20	.21
Digestive system, others	155	56.37	4	1.45	1	.36	121	47.03	6	2.33	.....	.....	4,539	48.42	37	.39	14	.15
Total diseases of the digestive system	3,169	1,152.36	9	3.27	8	2.90	1,706	663.04	10	3.89	.....	.....	59,743	637.30	126	1.33	197	2.09
Heart, diseases of	20	7.27	7	2.55	1	.36	10	3.89	4	1.55	.....	.....	312	3.33	60	.64	12	.13
Arteries and veins	6	2.18	2	.73	.....	.....	7	2.72	.....	.....	.....	.....	162	1.73	20	.21	.....	.....
Total diseases of the circulatory system	26	9.45	9	3.28	1	.36	17	6.61	4	1.55	.....	.....	474	5.06	80	.85	12	.13
Bronchitis	162	58.91	5	1.82	.....	.....	215	83.56	.....	.....	.....	.....	7,405	78.99	32	.34	1	.01
Pneumonia	16	5.82	1	.36	1	.36	16	6.22	.....	.....	1	.39	749	7.99	9	.10	93	.99
Pleurisy	20	7.27	.....	.....	.....	.....	18	7	.....	.....	.....	.....	363	3.87	3	.03	5	.05
Respiratory system, others	73	26.55	2	.73	.....	.....	146	56.75	2	.78	.....	.....	4,074	43.46	16	.17	3	.03
Total diseases of the respiratory organs	271	98.55	8	2.91	1	.36	395	153.53	2	.78	1	.39	12,591	134.31	60	.64	102	1.08

Varicocele	18	6.54	4	1.45			2	.78					235	2.51	16	.17		
Genito-urinary, others	32	11.64	2	.73			31	12.05	1	.39			873	9.31	16	.17	2	.02
Total diseases of the genito-urinary system	69	25.09	6	2.18	1	.36	44	17.11	1	.39			1,301	13.88	48	.51	13	.14
Adenitis	14	5.09	1	.36			18	7	1	.39			313	3.34	3	.03		
Lymphatic system, others	2	.73					3	1.17					89	.95	2	.02		
Total diseases of the lymphatic system	16	5.82	1	.36			21	8.17	1	.39			402	4.29	5	.05		
Rheumatism, muscular	150	54.55	2	.73			173	67.24	4	1.55			4,957	52.87	57	.61		
Osteitis and periostitis	3	1.09					7	2.72					105	1.12	3	.03		
Arthritis and synovitis	14	5.09					22	8.55	1	.39			536	5.72	17	.18		
Rheumatism, chronic articular	11	4	1	.36			12	4.66	2	.78			517	5.51	43	.46	1	.01
Muscles, bones, and joints, others	5	1.82	1	.36			8	3.11	2	.78			166	1.77	28	.30		
Total diseases of the muscles, bones, and joints	183	66.55	4	1.45			222	86.28	9	3.50			6,281	66.99	148	1.58	1	.01
Total diseases of the integumentary system, all	251	91.28	1	.36			204	79.28					4,153	44.30	17	.18	3	.03
Total diseases of the eye	46	16.73	1	.36			27	10.49					852	9.09	30	.32		
Total diseases of the ear	16	5.82					39	15.16	1	.39			667	7.11	28	.30	2	.02
Total diseases of the nose									2	.78			51	.54	3	.03		
Total unclassified	48	17.45			1	.36	86	33.43			1	.39	2,094	22.34	53	.57	36	.38
Total for diseases	7,419	2,697.82	75	27.28	75	27.28	4,456	1,731.88	43	16.71	25	9.72	189,710	2,023.70	1,130	12.05	25.29	26.98
Drowning							1	.39									13	.14
Exhaustion from exposure and fatigue	41	14.91					21	8.16					1,018	10.86	8	.09	3	.03
Heat stroke	10	3.64					2	.78					273	2.91	9	.10	1	.01
Lightning													22	.23			2	.02
Venomous bites, stings, and wounds	13	4.73					28	10.88					266	2.84	1	.01		
Abrasions, blisters, burns, and scalds	28	10.18					46	17.88					1,067	11.38	1	.01		
Compression and concussion of brain	5	1.82			1	.36	2	.78					50	.53	2	.02	1	.01
Contusions and sprains	343	124.73	9	3.27			297	115.43					2,889	30.82	12	.13		
Dislocations	10	3.64	2	.73	1	.36	5	1.94					154	1.64	7	.07		
Fractures (not shot)	44	16	3	1.09	3	1.09	27	10.49	1	.39			419	4.47	10	.11	10	.11
Hernia	26	9.45	9	3.27			22	8.55	6	2.33			709	7.56	94	1		
Wounds, contused, lacerated, and punctured	98	35.64			1	.36	64	24.87					913	9.74	4	.04		
Wounds, incised	29	10.55			1	.36	30	11.66					611	6.52	1	.01	6	.06
Wounds, gunshot	118	42.91			24	8.73	20	7.77			3	1.17	459	4.90	18	.19	91	.97
Secondary results of injury	6	2.18	1	.36			3	1.17	1	.39			69	.74	15	.16	2	.02
Other injuries	28	10.18	2	.73	3	1.09	24	9.33					381	4.06	9	.10	17	.18
Total for injuries	799	290.55	26	9.45	34	12.36	592	230.08	8	3.11	3	1.17	9,300	99.20	191	2.04	146	1.56
Total for diseases and injuries	8,218	2,988.36	101	36.73	109	39.64	5,048	1,961.91	51	19.82	28	10.88	199,010	2,122.91	1,321	14.09	2,675	28.54

TABLE IV.—*Volunteer Army, 1898.—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by arms of the service and countries in which service was rendered*—Continued.

Causes of admission to sick report.	Engineers.						Signal Corps.						Army.					
Mean strength	1,504.						589.						101,160.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever													35	0.35			4	0.04
Measles	6	3.99					3	5.09					6,217	61.46	7	0.07	58	.57
Smallpox							4	6.79					73	.72			16	.16
Vaccinia	319	212.10					15	25.47					4,234	41.85	1	.01		
Influenza	77	51.20					3	5.09					2,732	27.01	1	.01		
Dengue	20	13.30											213	2.11			2	.02
Mumps	5	3.32											1,863	18.42	2	.02		
Diphtheria													42	.42			1	.01
Typhoid fever	224	148.94			17	11.30	78	132.43	1	1.70	5	8.49	16,796	166.03	25	.25	1,738	17.18
Yellow fever							6	10.19			1	1.70	565	5.58			74	.73
Cerebro-spinal fever							2	3.40					108	1.07	3	.03	65	.64
Malarial fever, intermittent	462	307.18					158	268.25					39,310	388.59	1	.01		
Malarial fever, remittent	330	219.42			1	.66	100	169.78					17,382	171.82	22	.22	74	.73
Malarial fever, pernicious	3	1.99			1	.66	14	23.77			3	5.09	219	2.16	5	.05	108	1.07
Malarial cachexia	2	1.33					4	6.79	1	1.70			1,112	10.99	19	.19	16	.16
Fever, undetermined	75	49.87					2	3.40					3,011	29.76			1	.01
Erysipelas	7	4.65											67	.66				
Septicæmia and tetanus													18	.18			14	.14
Rheumatic fever	6	3.99					1	1.70					345	3.41	8	.08		
Consumption	7	4.65											418	4.13	118	1.17	24	.24
Cancer													13	.13	1	.01	2	.02
Syphilis and results	14	9.31					4	6.79					1,057	10.45	97	.96	1	.01
Gonorrhea and results	45	29.92	1	0.66			19	32.26					5,257	51.97	46	.45	1	.01
Chancroid and results	15	9.97					7	11.88					2,083	20.59	10	.10		
Infections, others													338	3.34	4	.04		
Total infectious diseases	1,617	1,075.13	1	.66	19	12.62	420	713.08	2	3.40	9	15.28	103,508	1,023.20	370	3.67	2,199	21.74
Anæmia	10	6.65					9	15.28					360	3.56	4	.04		
Nutrition, others	11	7.31					1	1.70					519	5.13	20	.20	3	.03
Total diseases of nutrition	21	13.96					10	16.98					879	8.69	24	.24	3	.03

Insanity	4	2.66	1	.66									103	1.02	55	.54	2	.02
Meningitis													54	.53			25	.25
Poisoning, narcotic													48	.47	7	.07	3	.03
Nervous system, others	52	34.58					7	11.88					2,551	25.22	34	.34	2	.02
Total diseases of the nervous system	87	57.85	2	1.32	1	.66	22	37.34	1	1.70			3,910	38.64	193	1.91	76	.76
Poisoning, irritant							13	22.07					244	2.41	1	.01	9	.09
Tonsillitis, pharyngitis, and sore throat	22	14.63	1	.66									3,014	29.79	2	.02	1	.01
Peritonitis	26	17.29											98	.97			22	.22
Dyspepsia, colic, and constipation	193	128.32	2	1.33			53	89.98					9,410	93.02	23	.23	3	.03
Gastritis	44	29.26	1	.66			7	11.88					2,250	22.24	9	.09	4	.04
Diarrheal diseases	733	487.37	1	.66	1	.66	191	324.28					43,270	427.74	54	.53	114	1.13
Enteritis	7	4.65					10	16.98					2,566	25.36	4	.04	16	.16
Perityphlitis and appendicitis	5	3.32					1	1.70					256	2.53	10	.10	22	.22
Digestive system, others	198	131.65			1	.66	23	39.05					5,036	49.78	47	.46	16	.16
Total diseases of the digestive system	1,228	816.49	5	3.31	2	1.32	298	505.94					66,144	653.84	150	1.48	207	2.06
Heart, disease of	9	5.98	1	.66			5	8.49	2	3.40			356	3.52	74	.73	13	.13
Arteries and veins	7	4.65	1	.66			1	1.70					183	1.81	23	.23		
Total diseases of the circulatory system	16	10.63	2	1.32			6	10.19	2	3.40			539	5.33	97	.96	13	.13
Bronchitis	133	88.44					20	33.96					7,935	78.44	37	.37	1	.01
Pneumonia	13	8.64			2	1.33							794	7.85	10	.10	97	.96
Pleurisy	4	2.66	1	.66	1	.66	5	8.49					410	4.05	4	.04	6	.06
Respiratory system, others	97	64.50					29	49.23					4,419	43.68	20	.20	3	.03
Total diseases of the respiratory organs	247	164.24	1	.66	3	1.99	54	91.68					13,558	134.02	71	.71	107	1.06
Kidneys, diseases of	4	2.66			1	.66							227	2.24	16	.16	13	.13
Varicocele	9	5.98											264	2.61	20	.20		
Genito-urinary, others	17	11.30					5	8.49					958	9.47	19	.19	2	.02
Total diseases of the genito-urinary system	30	19.94			1	.66	5	8.49					1,449	14.32	55	.55	15	.15
Adenitis							4	6.79					349	3.45	5	.05		
Lymphatic system, others	9	5.98					1	1.70					104	1.03	2	.02		
Total diseases of the lymphatic system	9	5.98					5	8.49					453	4.48	7	.07		
Rheumatism, muscular	192	127.66	1	.66			20	33.96					5,492	54.29	64	.63		
Osteitis and periostitis	1	.66											116	1.15	3	.03		
Arthritis and synovitis	9	5.98					5	8.49					586	5.79	18	.18		
Rheumatism, chronic articular	11	7.31	2	1.33			2	3.40	1	1.70			553	5.47	49	.48	1	.01
Muscles, bones, and joints, others	9	5.98	1	.66			2	3.40					190	1.88	32	.30		
Total diseases of the muscles, bones, and joints	222	147.61	4	2.65			29	49.25	1	1.70			6,937	68.58	166	1.62	1	.01

TABLE IV.—*Volunteer Army, 1898.—Admission to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by arms of the service and countries in which service was rendered*—Continued.

	Cuba.						Porto Rico.						Pacific Islands.					
Mean strength	4,535.						3,763.						7,004.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Total diseases of the integumentary system, all	63	41.89					20	33.96					4,691	46.37	18	0.18	3	0.03
Total diseases of the eye	25	16.62	4	2.66			5	8.49	1	1.70			955	9.44	36	.36		
Total diseases of the ear	22	14.63	1	.66									744	7.35	30	.30	2	.02
Total diseases of the nose	1	.66					1	1.70					53	.52	5	.05		
Total unclassified	27	17.95					8	13.58					2,263	22.37	53	.52	38	.38
Total for diseases	3,615	2,403.59	20	13.30	26	17.29	883	1,499.15	7	11.88	9	15.28	206,083	2,037.20	1,275	12.60	2,664	26.33
Drowning													1	.01			13	.13
Exhaustion from exposure and fatigue	17	11.30					5	8.49			1	1.70	1,102	10.89	8	.08	4	.04
Heat stroke	4	2.66					6	10.19					295	2.92	9	.09	1	.01
Lightning													22	.22			2	.02
Venomous bites, stings, and wounds	12	7.98											319	3.15	1	.01		
Abrasions, blisters, burns, and scalds	26	17.29					6	10.19					1,173	11.60	1	.01		
Compression and concussion of brain													57	.56	2	.02	2	.02
Contusions and sprains	73	48.54					23	39.05					3,625	35.84	21	.21		
Dislocations	4	2.66					3	5.09					176	1.74	9	.09	1	.01
Fractures (not shot)	12	7.98					4	6.79	1	1.70			506	5.00	15	.15	13	.13
Herniæ	33	21.94	4	2.66	1	.66	5	8.49	1	1.70			795	7.86	114	1.13	1	.01
Wounds, contused, lacerated, and punctured	22	14.63					3	5.09					1,100	10.87	4	.04	1	.01
Wounds, incised	19	12.63					3	5.09					692	6.84	1	.01	7	.07
Wounds, gunshot	2	1.33					1	1.70					600	5.93	18	.18	118	1.17
Secondary results of injury	1	.66											79	.78	17	.17	2	.02
Other injuries	10	6.65			1	.66	4	6.79			1	1.70	447	4.42	11	.11	22	.22
Total for injuries	235	156.25	4	2.66	2	1.33	63	106.96	2	3.40	2	3.40	10,989	108.63	231	2.28	187	1.85
Total for diseases and injuries	3,850	2,559.84	24	15.96	28	18.62	946	1,606.11	9	15.28	11	18.68	217,072	2,145.83	1,506	14.89	2,851	28.18

TABLE 14.—*Admissions to sick report, discharges, and deaths from certain causes, and their ratios per thousand of mean strength, arranged by arms of the service and countries in which service was rendered*—Continued.

Causes of admission to sick report.	Cuba.						Porto Rico.						Pacific Islands.					
Mean strength	4,535.						3,763.						7,004.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	2	0.44			1	0.22	1	0.27										
Measles	149	32.86			1	.22	96	25.51					226	32.27			2	0.29
Smallpox	1	.22					5	1.33			1	0.27	59	8.42			15	2.14
Vaccinia	30	6.62					2	.53					271	38.69				
Influenza	1	.22					7	1.86					70	9.99				
Dengue	40	8.82			2	.44	11	2.92					4	.57				
Mumps	1	.22					13	3.45					340	48.54				
Diphtheria	8	1.76											4	.57				
Typhoid fever	433	95.48			100	22.05	1,214	322.62			153	40.66	632	90.23	7	1.00	65	9.28
Yellow fever	552	121.72			72	15.88	2	.53										
Cerebro-spinal fever	9	1.98			9	1.98							3	.43	1	.14	1	.14
Malarial fever, intermittent	8,954	1,974.42	1	0.22			1,449	385.06					1,158	165.33				
Malarial fever, remittent	2,240	493.94			27	5.95	1,177	312.78	3	0.80	7	1.86	1,787	255.14	1	.14	8	1.14
Malarial fever, pernicious	77	16.98			37	8.16	6	1.59			4	1.06	4	.57			2	.29
Malarial cachexia	316	69.68	1	.22	3	.66	10	2.66					10	1.43				
Fever, undetermined	196	43.22					195	51.82					411	58.68				
Erysipelas							2	.53					5	.71				
Septicæmia and tetanus	1	.22											3	.43			4	.57
Rheumatic fever	18	3.97			2	.44	9	2.39					22	3.14	1	.14		
Consumption	36	7.94	4	.88			15	3.99	4	1.06	3	.80	46	6.57	12	1.71	5	.71
Cancer	1	.22																
Syphilis and results	51	11.25	4	.88			26	6.91	3	.80			45	6.42				
Gonorrhœa and results	177	39.03	1	.22			116	30.83					539	76.96				
Chancroid and results	117	25.80	2	.44			54	14.35					512	73.10				
Infections, others	1	.22	2	.44			6	1.59					17	2.43				
Total infectious diseases	13,411	2,957.22	15	3.30	254	56.00	4,416	1,173.52	10	2.66	168	44.65	6,168	880.62	22	3.13	102	14.56
Anæmia	7	1.54					12	3.19	1	.27			44	6.28	1	.14		
Nutrition, others	246	54.25	1	.22	1	.22	15	3.99					4	.57			1	.14
Total diseases of nutrition	253	55.79	1	.22	1	.22	27	7.18	1	.27			48	6.85	1	.14	1	.14

TABLE IV.—*Volunteer Army, 1898.—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by arms of the service and countries in which service was rendered.*—Continued.

Causes of admission to sick report.	Engineers.						Signal corps.						Army.					
Mean strength	1,504.						589.						101,160.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Alcoholism	103	22.71	.....	.....	4	.88	11	2.92	.....	.....	.....	.....	33	4.71	.....	.....	.....	.....
Brain and spinal cord	18	3.97	3	.66	1	.22	16	4.25	1	.27	6	1.59	23	3.28	8	1.14	2	.29
Insanity	6	1.32	.....	.....	.....	.....	2	.53	.....	.....	.....	.....	6	.86	1	.14	.....	.....
Meningitis	2	.44	.....	.....	2	.44	2	.53	3	.80	2	.53	9	1.28	.....	.....	3	.43
Poisoning, narcotic	5	1.10	.....	.....	.....	.....	8	2.13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Nervous system, others	104	22.93	1	.22	.....	.....	46	12.22	.....	.....	.....	.....	132	18.85	4	.57	.....	.....
Total diseases of the nervous system	238	52.47	4	.88	7	1.54	85	22.58	4	1.07	8	2.12	203	28.98	13	1.85	5	.72
Poisoning, irritant	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.27	8	1.14	.....	.....	1	.14
Tonsillitis, pharyngitis, and sore throat	50	11.03	.....	.....	.....	.....	51	13.55	.....	.....	.....	.....	226	32.27	.....	.....	.....	.....
Peritonitis	3	.66	.....	.....	1	.22	2	.53	.....	.....	.....	.....	28	4.00	.....	.....	.....	.....
Dyspepsia, colic, and constipation	212	46.75	.....	.....	.....	.....	104	27.64	.....	.....	.....	.....	329	46.97	.....	.....	.....	.....
Gastritis	60	13.23	.....	.....	.....	.....	99	26.31	.....	.....	1	.27	149	21.27	2	.29	1	.14
Diarrheal diseases	1,599	352.59	1	.22	39	8.60	2,054	545.84	.....	.....	4	1.06	2,705	386.21	17	2.43	20	2.86
Enteritis	88	19.41	.....	.....	3	.66	120	31.89	.....	.....	.....	.....	87	12.42	2	.29	2	.29
Perityphlitis and appendicitis	11	2.43	.....	.....	2	.44	12	3.19	.....	.....	.....	.....	34	4.85	.....	.....	2	.29
Digestive system, others	154	33.96	2	.44	2	.44	118	31.36	.....	.....	1	.27	119	16.99	1	.14	.....	.....
Total diseases of the digestive system	2,177	480.06	3	.66	47	10.36	2,560	680.31	.....	.....	7	1.87	3,685	526.12	22	3.15	26	3.72
Heart, diseases of	22	4.85	3	.66	2	.44	15	3.99	1	.27	1	.27	29	4.14	10	1.43	2	.29
Arteries and veins	8	1.76	1	.22	.....	.....	13	3.45	.....	.....	.....	.....	20	2.86	1	.14	.....	.....
Total diseases of the circulatory system	30	6.61	4	.88	2	.44	28	7.44	1	.27	1	.27	49	7.00	11	1.57	2	.29
Bronchitis	129	28.45	.....	.....	.....	.....	110	29.23	1	.27	.....	.....	345	49.26	7	1.00	.....	.....
Pneumonia	20	4.41	.....	.....	3	.66	9	2.39	.....	.....	1	.27	48	6.85	4	.57	8	1.14
Pleurisy	9	1.98	.....	.....	.....	.....	6	1.59	.....	.....	.....	.....	17	2.43	.....	.....	.....	.....
Respiratory system, others	41	9.04	1	.22	1	.22	11	2.92	.....	.....	.....	.....	135	19.27	1	.14	.....	.....
Total diseases of the respiratory organs	199	43.88	1	.22	4	.88	136	36.13	1	.27	1	.27	545	77.81	12	1.71	8	1.14

Kidneys, diseases of	13	2.87			1	.22	12	2.65			1	.27	13	2.14			1	.14
Varicocele	7	1.54					6	1.59					34	4.85	1	.14		
Genito-urinary, others	40	8.82	1	.22			34	9.04					56	7.99				
Total diseases of the genito-urinary system	60	13.23	1	.22	1	.22	50	13.29			1	.27	105	14.98	1	.14	1	.14
Adenitis	13	2.87					19	5.05					39	5.57				
Lymphatic system, others	7	1.54					2	.53					14	2.00				
Total diseases of the lymphatic system	20	4.41					21	5.58					53	7.57				
Rheumatism, muscular	223	49.17	1	.22			124	32.95					228	32.55	4	.57		
Osteitis and periostitis	1	.22					1	.27					11	1.57				
Arthritis and synovitis	19	4.19					21	5.58					58	8.28	5	.71		
Rheumatism, chronic articular	36	7.94	1	.22			10	2.66					92	13.13	15	2.14	1	.14
Muscles, bones, and joints, others	3	.66	1	.22			7	1.86					10	1.43				
Total diseases of the muscles, bones, and joints	282	62.18	3	.66			163	43.32					399	56.96	24	3.42	1	.14
Total diseases of the integumentary system, all	151	33.30	3	.66			105	27.90					596	85.09			3	.43
Total diseases of the eye	18	3.97	1	.22			11	2.92					65	9.28	8	1.14		
Total diseases of the ear	8	1.76					20	5.31					113	16.13	3	.43		
Total diseases of the nose	3	.66	1	.22									3	.43				
Total unclassified	924	203.75			18	3.97	126	33.48					13	1.86	1	.14		
Total for diseases	17,774	3,919.29	37	8.16	334	73.65	7,748	2,058.99	17	4.52	186	49.43	12,045	1,719.73	118	16.85	149	21.27
Drowning					1	.22							1	.14			1	.14
Exhaustion from exposure and fatigue	87	19.19			1	.22	161	42.78			1	.27	19	2.71	2	.29		
Heat stroke	73	16.10	3	.66			14	3.72					7	1.00				
Venomous bites, stings, and wounds	6	1.32					16	4.25					71	10.14				
Abrasions, blisters, burns, and scalds	18	3.97					34	9.04					110	15.70				
Compression and concussion of brain							3	.80					6	.86				
Contusions and sprains	80	17.64					59	15.68					198	28.27	3	.43		
Dislocations	7	1.54					6	1.59					14	2.00				
Fractures (not shot)	21	4.63					17	4.52	1	.27	1	.27	31	4.43			1	.14
Hernia	36	7.94	4	.88			47	12.49	1	.27	1	.27	55	7.85	6	.86		
Wounds, contused, lacerated, and punctured	42	9.26	2	.44			20	5.31					93	13.28				
Wounds, incised	27	5.95					13	3.45					50	7.14			1	.14
Wounds, gunshot	264	58.22			54	11.91	34	9.04			7	1.86	99	14.14	8	1.14	20	2.86
Secondary results of injury	1	.22											6	.86				
Other injuries	23	5.07					16	4.25					27	3.85			1	.14
Total for injuries	685	151.05	9	1.98	56	12.35	440	116.93	2	.53	10	2.66	787	112.36	19	2.71	24	3.43
Total for diseases and injuries	18,459	4,070.34	46	10.14	390	86.00	8,188	2,175.92	19	5.05	196	52.09	12,832	1,832.10	137	19.56	173	24.70

TABLE IV.—*Volunteer Army, 1898—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by arms of the service and countries in which service was rendered*—Continued.

Causes of admission to sick report.	Total islands.						Total United States.					
Mean strength	15,302.						85,269.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	3	0.20	.....	.....	1	0.07	32	0.38	.....	.....	3	0.04
Measles	471	30.78	.....	.....	3	.20	5,743	67.36	7	0.08	55	.65
Smallpox	65	4.25	.....	.....	16	1.05	4	.05	.....	.....	.....	.....
Vaccinia	303	19.80	.....	.....	.....	.....	3,916	45.93	1	.01	.....	.....
Influenza	78	5.10	.....	.....	.....	.....	2,651	31.09	1	.01	.....	.....
Dengue	55	3.59	.....	.....	2	.13	158	1.85	.....	.....	.....	.....
Mumps	354	23.13	.....	.....	.....	.....	1,509	17.70	2	.02	.....	.....
Diphtheria	12	.78	.....	.....	.....	.....	30	.35	.....	.....	1	.01
Typhoid fever	2,279	148.94	7	0.46	318	20.78	14,439	169.34	17	.20	1,415	16.59
Yellow fever	554	36.20	.....	.....	72	4.71	5	.06	.....	.....	1	.01
Cerebro-spinal fever	12	.78	1	.07	10	.65	94	1.10	2	.02	55	.65
Malarial fever, intermittent	11,561	755.52	1	.07	.....	.....	27,591	323.57	.....	.....	.....	.....
Malarial fever, remittent	5,204	340.09	4	.26	42	2.74	12,078	141.65	18	.21	32	.38
Malarial fever, pernicious	87	5.69	.....	.....	43	2.81	118	1.38	5	.06	62	.73
Malarial cachexia	336	21.96	1	.07	3	.20	772	9.05	17	.20	13	.15
Fever, undetermined	802	52.41	.....	.....	.....	.....	2,207	25.88	.....	.....	1	.01
Erysipelas	7	.46	.....	.....	.....	.....	60	.70	.....	.....	.....	.....
Septicæmia and tetanus	4	.26	.....	.....	4	.26	14	.16	.....	.....	10	.12
Rheumatic fever	49	3.20	1	.07	2	.13	295	3.46	7	.08	.....	.....
Consumption	97	6.34	20	1.31	8	.52	321	3.76	98	1.15	14	.16
Cancer	1	.07	.....	.....	.....	.....	12	.14	1	.01	2	.02
Syphilis and results	122	7.97	7	.46	.....	.....	931	10.92	90	1.06	1	.01
Gonorrhea and results	832	54.37	1	.07	.....	.....	4,406	51.67	45	.53	1	.01
Chancroid and results	683	44.63	2	.13	.....	.....	1,393	16.34	8	.09	.....	.....
Infections, others	24	1.57	2	13	.....	.....	314	3.68	2	.02	.....	.....
Total infectious diseases	23,995	1,568.09	47	3.07	524	34.25	79,093	927.57	321	3.75	1,666	19.54
Anæmia	63	4.12	2	.13	.....	.....	288	3.38	2	.02	.....	.....
Nutrition, others	265	17.32	1	.07	2	.13	253	2.97	19	.22	1	.01
Total diseases of nutrition	328	21.44	3	.20	2	.13	541	6.35	21	.24	1	.01

Alcoholism	147	9.61			4	.26	417	4.89	25	.29	10	.12
Brain and spinal cord	57	3.72	12	.78	9	.59	518	6.08	59	.69	21	.25
Insanity	14	.91	1	.07			89	1.04	51	.60	2	.02
Meningitis	13	.85	3	.20	7	.46	41	.48			18	.21
Poisoning, narcotic	13	.85					35	.41	7	.08	3	.04
Nervous system, others	282	18.43	5	.33			2,262	26.52	29	.34	2	.02
Total diseases of the nervous system	526	34.38	21	1.37	20	1.31	3,362	39.42	171	2.00	56	.66
Poisoning, irritant	8	.52			2	.13	236	2.77	1	.01	7	.08
Tonsillitis, pharyngitis, and sore throat	327	21.37					2,674	31.36	2	.02	1	.01
Peritonitis	33	2.16			1	.07	65	.76			21	.25
Dyspepsia, colic, and constipation	645	42.15					8,712	102.17	23	.27	3	.04
Gastritis	308	20.13	2	.13	2	.13	1,935	22.69	7	.08	2	.02
Diarrheal diseases	6,358	415.50	18	1.18	63	4.12	36,721	430.65	36	.42	51	.60
Enteritis	295	19.28	2	.13	5	.33	2,261	26.52	2	.02	11	.13
Perityphlitis and appendicitis	57	3.72			4	.26	198	2.32	10	.12	18	.21
Digestive system, others	391	25.55	3	.20	3	.20	4,622	54.21	44	.54	13	.15
Total diseases of the digestive system	8,422	550.39	25	1.63	80	5.23	57,424	673.45	125	1.48	127	1.49
Heart, diseases of	66	4.31	14	.91	5	.33	285	3.34	58	.68	8	.09
Arteries and veins	41	2.68	2	.13			141	1.65	21	.25		
Total diseases of the circulatory system	107	6.99	16	1.05	5	.33	426	4.99	79	.93	8	.09
Bronchitis	584	38.16	8	.52			7,331	85.98	29	.34	1	.01
Pneumonia	77	5.03	4	.26	12	.78	717	8.41	6	.07	85	1.00
Pleurisy	32	2.09					373	4.37	4	.05	6	.07
Respiratory system, others	187	12.22	2	.13	1	.07	4,203	49.29	18	.21	2	.02
Total diseases of the respiratory organs	880	57.51	14	.91	13	.85	12,624	148.05	57	.67	94	1.10
Kidneys, diseases of	38	2.48			3	.20	189	2.22	16	.19	10	.12
Varicocele	47	3.07	1	.07			217	2.54	19	.22		
Genito-urinary, others	130	8.50	1	.07			823	9.65	18	.21	2	.02
Total diseases of the genito-urinary system	215	14.05	2	.13	3	.20	1,229	14.41	53	.62	12	.14
Adenitis	71	4.64					274	3.21	5	.06		
Lymphatic system, others	23	1.50					80	.94	2	.02		
Total diseases of the lymphatic system	94	6.14					354	4.15	7	.08		
Rheumatism, muscular	575	37.58	5	.33			4,897	57.43	59	.69		
Osteitis and periostitis	13	.85					103	1.21	3	.04		
Arthritis and synovitis	98	6.40	5	.33			483	5.66	13	.15		
Rheumatism, chronic articular	138	9.02	16	1.05	1	.07	413	4.84	32	.38		
Muscles, bones, and joints, others	20	1.31	1	.07			168	1.97	31	.36		
Total diseases of the muscles, bones, and joints	844	55.16	27	1.76	1	.07	6,064	71.11	138	1.62		

TABLE IV.—*Volunteer Army, 1898—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by arms of the service and countries in which service was rendered*—Continued.

Causes of admission to sick report.	Total islands.						Total United States.					
Mean strength	15,302.						85,269.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Total diseases of the integumentary system	852	55.68	3	0.20	3	0.20	3,819	44.79	15	0.18	.....	.....
Total diseases of the eye	94	6.14	9	.59	.....	.....	856	10.04	26	.30	.....	.....
Total diseases of the ear	141	9.21	3	.20	.....	.....	603	7.07	27	.32	2	0.02
Total diseases of the nose	6	.39	1	.07	.....	.....	46	.54	4	.05	.....	.....
Total unclassified	1,063	69.46	1	.07	18	1.18	1,192	13.98	52	.61	20	.23
Total for diseases	37,567	2,455.04	172	11.24	669	43.72	167,633	1,965.93	1,096	12.85	1,986	23.29
Drowning	1	.07	.....	.....	2	.13	.....	.....	.....	.....	11	.13
Exhaustion from exposure and fatigue	267	17.45	2	.13	2	.13	830	9.73	6	.07	1	.01
Heat stroke	94	6.14	3	.20	.....	.....	195	2.29	6	.07	1	.01
Lightning	.....	.....	.....	.....	.....	.....	22	.26	.....	.....	2	.02
Venomous bites, stings, and wounds	93	6.08	.....	.....	.....	.....	226	2.65	1	.01	.....	.....
Abrasions, blisters, burns, and scalds	162	10.59	.....	.....	.....	.....	1,005	11.79	1	.01	.....	.....
Compression and concussion of brain	9	.59	.....	.....	.....	.....	48	.56	2	.02	2	.02
Contusions and sprains	337	22.02	3	20	.....	.....	3,265	38.29	18	.21	.....	.....
Dislocations	27	1.76	.....	.....	.....	.....	146	1.71	9	.11	1	.01
Fractures (not shot)	69	4.51	1	.07	2	.13	433	5.08	13	.15	11	.13
Hernia	138	9.02	11	.72	1	.07	652	7.65	102	1.20	.....	.....
Wounds, contused, lacerated, and punctured	155	10.13	2	.13	.....	.....	942	11.05	2	.02	1	.01
Wounds, incised	90	5.88	.....	.....	1	.07	599	7.02	1	.01	6	.07
Wounds, gunshot	397	25.94	8	.52	81	5.29	202	2.37	10	.12	37	.43
Secondary results of injury	7	.46	.....	.....	.....	.....	72	.84	17	.20	2	.02
Other injuries	66	4.31	.....	.....	1	.07	377	4.42	11	.13	20	.23
Total for injuries	1,912	124.94	30	1.96	90	5.88	9,014	105.71	199	2.33	95	1.11
Total for diseases and injuries	39,479	2,579.99	202	13.20	759	49.60	176,647	2,071.65	1,295	15.19	2,081	24.41

TABLE V.—*Volunteer Army, 1899—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by arms of the service and the countries in which service was rendered.*

Causes of admission to sick report.	Cavalry.						Artillery.						Infantry.					
Mean strength	351.						612.						39,148.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever													14	0.36				
Measles	1	2.85					8	13.07					1,204	30.75			8	0.20
Smallpox							2	3.27					208	5.31			59	1.51
Vaccinia	20	56.98					17	27.78					3,416	87.25			1	.03
Influenza	1	2.85					15	24.51					3,112	79.49			4	.10
Dengue	224	638.18											318	8.12				
Mumps	2	5.70					8	13.07					714	18.24				
Diphtheria													30	.77			4	.10
Typhoid fever	7	19.94			2	5.70	6	9.80			2	3.27	657	16.78	12	0.31	74	1.89
Yellow fever													3	.08				
Cerebro-spinal fever													11	.28			8	.20
Malarial fever, intermittent	776	2,210.83	1	2.85			66	107.85					10,689	273.04	2	.05		
Malarial fever, remittent	95	270.69					292	477.12					6,980	178.30	5	.13	6	.15
Malarial fever, pernicious	1	2.85											52	1.33			29	.74
Malarial cachexia	14	39.89					1	1.63					351	8.97	9	.23	8	.20
Fever, undetermined	22	62.68					7	11.44					846	21.61				
Erysipelas							1	1.63			1	1.63	21	.54			1	.03
Septicæmia and tetanus							1	1.63					2	.05			1	.03
Rheumatic fever	2	5.70					3	4.90					123	3.14	3	.08		
Consumption	2	5.70	1	2.85					2	3.27			112	2.86	38	.97	16	.41
Cancer	1	2.85											4	.10			1	.03
Syphilis and results	8	22.79					15	24.51	2	3.27			491	12.54	50	1.28		
Gonorrhœa and results	28	79.77					51	83.33					2,325	59.39	15	.38		
Chancroid and results	31	88.31					45	73.53					1,508	38.52	2	.05		
Infections, others													79	2.02	2	.05	3	.08
Total infectious diseases	1,235	3,518.56	2	5.70	2	5.70	538	879.07	4	6.54	3	4.90	33,270	849.85	138	3.53	223	5.70
Anæmia	2	5.70											138	3.53	7	.18		
Nutrition, others	3	8.55	1	2.85			1	1.63					45	1.15	3	.08	2	.05
Total diseases of nutrition	5	14.25	1	2.85			1	1.63					183	4.68	10	.26	2	.05

TABLE V.—*Volunteer Army, 1899—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by arms of the service and the countries in which service was rendered*—Continued.

Causes of admission to sick report.	Cavalry.						Artillery.						Infantry.					
Mean strength	351.						612.						39,148.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Alcoholism	2	5.70	.....	.....	.....	.....	16	26.14	.....	.....	.....	.....	285	7.28	3	0.08	5	0.13
Brain and spinal cord	1	2.85	.....	.....	.....	.....	1	1.63	.....	.....	.....	.....	145	3.70	12	.31	4	.10
Insanity	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	38	.97	18	.46	.....	.....
Meningitis	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	22	.56	4	.10	10	.26
Poisoning, narcotic	.....	.....	.....	.....	.....	.....	1	1.63	.....	.....	.....	.....	10	.26	1	.03	2	.05
Nervous system, others	9	25.64	.....	.....	.....	.....	18	29.41	2	3.27	.....	.....	973	24.85	14	.36	.....	.....
Total diseases of the nervous system	12	34.19	.....	.....	.....	.....	36	58.81	2	3.27	.....	.....	1,473	37.62	52	1.34	21	.54
Poisoning, irritant	.....	.....	.....	.....	.....	.....	5	8.17	.....	.....	.....	.....	99	2.53	.....	.....	2	.05
Tonsillitis, pharyngitis, and sore throat	10	28.49	.....	.....	.....	.....	15	24.51	.....	.....	.....	.....	1,298	33.15	.....	.....	1	.03
Peritonitis	.....	.....	.....	.....	.....	.....	1	1.63	.....	.....	.....	.....	19	.49	.....	.....	4	.10
Dyspepsia, colic, and constipation	37	105.42	.....	.....	.....	.....	32	52.29	1	1.63	.....	.....	2,627	67.10	1	.03	.....	.....
Gastritis	3	8.55	.....	.....	.....	.....	31	50.65	.....	.....	.....	.....	1,021	26.08	5	.13	.....	.....
Diarrheal diseases	222	632.48	.....	.....	1	2.85	338	552.28	.....	.....	1	1.63	12,506	319.45	28	.72	72	1.84
Enteritis	4	11.40	.....	.....	.....	.....	29	47.38	1	1.63	1	1.63	317	8.10	1	.03	5	.13
Perityphlitis and appendicitis	.....	.....	.....	.....	.....	.....	2	3.27	.....	.....	.....	.....	90	2.30	1	.03	3	.08
Digestive system, others	12	34.19	.....	.....	.....	.....	28	45.75	.....	.....	1	1.63	1,169	29.86	18	.46	6	.15
Total diseases of the digestive system	288	820.53	.....	.....	1	2.85	481	785.93	2	3.26	3	4.89	19,146	489.07	54	1.40	93	2.38
Heart, diseases of	6	17.09	.....	.....	.....	.....	1	1.63	1	1.63	.....	.....	132	3.37	21	.54	3	.08
Arteries and veins	.....	.....	.....	.....	.....	.....	6	9.80	.....	.....	.....	.....	87	2.22	9	.23	2	.05
Total diseases of the circulatory system	6	17.09	.....	.....	.....	.....	7	11.43	1	1.63	.....	.....	219	5.59	30	.77	5	.13
Bronchitis	18	51.28	.....	.....	.....	.....	59	96.41	1	1.63	.....	.....	3,108	79.38	7	.18	.....	.....
Pneumonia	3	8.55	.....	.....	.....	.....	2	3.27	.....	.....	1	1.63	289	7.38	3	.08	46	1.18
Pleurisy	5	14.25	.....	.....	.....	.....	3	4.90	.....	.....	.....	.....	121	3.09	2	.05	.....	.....
Respiratory system, others	1	2.85	.....	.....	.....	.....	25	40.85	1	1.63	.....	.....	1,710	43.68	3	.08	3	.08
Total diseases of the respiratory organs	27	76.93	.....	.....	.....	.....	89	145.43	2	3.26	1	1.63	5,228	133.53	15	.39	49	1.26

Kidneys, diseases of	2	5.70											65	1.66	3	.08	7	.18
Varicocele	1	2.85					2	3.27					159	4.06	5	.13		
Genito-urinary, others	4	11.40					14	22.88					528	13.49	10	.26		
Total diseases of the genito-urinary system	7	19.95					16	26.15					752	19.21	18	.47	7	.18
Adenitis	2	5.70					7	11.44					188	4.80	1	.03		
Lymphatic system, others													24	.61	1	.03		
Total diseases of the lymphatic system	2	5.70					7	11.44					212	5.41	2	.06		
Rheumatism, muscular	7	19.94					42	68.63	1	1.63			1,901	48.56	20	.51		
Osteitis and periostitis							1	1.63	1	1.63			54	1.38	2	.05		
Arthritis and synovitis	3	8.55					6	9.80					250	6.39	5	.13		
Rheumatism, chronic articular	2	5.70					11	17.97					399	10.19	25	.64		
Muscles, bones, and joints, others							2	3.27	1	1.63			79	2.02	6	.15		
Total diseases of the muscles, bones, and joints	12	34.19					62	101.30	3	4.89			2,683	68.54	58	1.48		
Total diseases of the integumentary system, all	64	182.35					125	204.25					3,211	82.02	2	.05		
Total diseases of the eye	2	5.70					18	29.41	2	3.27			425	10.86	8	.20		
Total diseases of the ear	9	25.64					23	37.58	3	4.90			414	10.57	30	.77		
Total diseases of the nose	1	2.85											45	1.15	1	.03		
Total unclassified	2	5.70											193	4.93				
Total for diseases	1,672	4,763.53	3	8.55	3	8.55	1,403	2,292.49	19	31.05	7	11.44	67,454	1,723.05	418	10.68	400	10.22
Drowning											1	1.63					17	.43
Exhaustion from exposure and fatigue	12	34.19					7	11.44					691	17.65			1	.03
Heat stroke	2	5.70					2	3.27					57	1.46	1	.03		
Lightning													2	.05				
Venomous bites, stings, and wounds	4	11.40					11	17.97					251	6.41				
Abrasions, blisters, burns, and scalds	5	14.25					59	96.41					528	13.49				
Compression and concussion of brain	1	2.85											8	.20			1	.03
Contusions and sprains	22	62.68					25	40.85					1,512	38.62	4	.10		
Dislocations													66	1.69				
Fractures (not shot)	9	25.64					3	4.90	2	3.27			186	4.75	6	.15	2	.05
Hernia	3	8.55					6	9.80	1	1.63			301	7.69	28	.72		
Wounds, contused, lacerated, and punctured	2	5.70					11	17.97					536	13.69	1	.03	1	.03
Wounds, incised	4	11.40					5	8.17					402	10.27			3	.08
Wounds, gunshot	15	42.74					20	32.68			7	11.44	1,221	31.19	50	1.28	283	7.23
Secondary results of injury													64	1.63	5	.13		
Other injuries							3	4.90					168	4.29	2	.05	6	.15
Total for injuries	79	225.07					152	248.37	3	4.90	8	13.07	5,993	153.08	97	2.48	314	8.02
Total for diseases and injuries	1,751	4,988.60	3	8.55	3	8.55	1,555	2,540.85	22	35.95	15	24.51	73,447	1,876.13	515	13.16	714	18.24

TABLE V.—*Volunteer Army, 1899—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by arms of the service and the countries in which service was rendered*—Continued.

	Engineers.						Signal Corps.						Army.					
Mean strength	693.						296.						41,100.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever													14	0.34				
Measles	20	28.86			1	1.44	5	16.89					1,238	30.12			9	0.22
Smallpox							1	3.38					211	5.13			59	1.44
Vaccinia	36	51.95					11	37.16					3,500	85.16			1	.02
Influenza	99	142.87											3,227	78.51			4	.10
Dengue	14	20.20											556	13.53				
Mumps	8	11.54											732	17.81				
Diphtheria													30	.73			4	.10
Typhoid fever	15	21.64					18	60.81					703	17.10	12	0.29	78	1.90
Yellow fever	1	1.44			1	1.44	1	3.38			1	3.38	5	.12			2	.05
Cerebro-spinal fever							1	3.38					12	.29			8	.17
Malarial fever, intermittent	244	352.09	1	1.44			51	172.30					11,826	287.74	4	.10		
Malarial fever, remittent	74	106.79					39	131.76					7,480	182.00	5	.12	6	.15
Malarial fever, pernicious							1	3.38					54	1.31			29	.71
Malarial cachexia	81	116.88					4	13.51					451	10.97	9	.22	8	.19
Fever, undetermined	20	28.86											895	21.78				
Erysipelas	1	1.44											23	.56			2	.05
Septicæmia and tetanus	2	2.89											5	.12			1	.02
Rheumatic fever	1	1.44											129	3.14	3	.07		
Consumption	2	2.89					1	3.38	1	3.38			117	2.85	42	1.02	16	.39
Cancer							1	3.38					6	.15			1	.02
Syphilis and results	10	14.43											524	12.75	52	1.27		
Gonorrhea and results	45	64.94					14	47.30	1	3.38			2,463	59.93	16	.39		
Chancroid and results	30	43.29					12	40.54					1,626	39.56	2	.05		
Infections, others	3	4.33											82	2.00	2	.05	3	.07
Total infectious diseases	706	1,018.77	1	1.44	2	2.88	160	540.55	2	6.76	1	3.38	35,909	873.70	147	3.58	231	5.60
Anæmia	1	1.44											141	3.43	7	.17		
Nutrition, others	7	10.10	1	1.44									56	1.36	5	.12	2	.05
Total diseases of nutrition	8	11.54	1	1.44									197	4.79	12	.29	2	.05
Alcoholism	19	27.41					2	6.76					324	7.88	3	.07	5	.12
Brain and spinal cord	6	8.66											153	3.72	12	.29	4	.10

Insanity			1	1.44									38	.92	19	.46		
Meningitis	1	1.44			1	1.44							23	.56	4	.10	11	.27
Poisoning, narcotic							1	3.38					12	.29	1	.02	2	.05
Nervous system, others	32	46.18					4	13.51					1,036	25.21	16	.39		
Total diseases of the nervous system	58	83.69	1	1.44	1	1.44	7	23.65					1,586	38.58	55	1.33	22	.54
Poisoning, irritant							2	6.76					106	2.58			2	.05
Tonsillitis, pharyngitis, and sore throat	25	36.07					4	13.51					1,352	32.90			1	.02
Peritonitis	3	4.33			2	2.89							23	.56			6	.15
Dyspepsia, colic, and constipation	66	95.24	1	1.44			10	33.78					2,772	67.44	3	.07		
Gastritis	10	14.43					6	20.27					1,071	26.06	5	.12		
Diarrheal diseases	236	340.55					172	581.08					13,474	327.84	28	.68	74	1.80
Enteritis	4	5.77					33	111.49					387	9.42	2	.05	6	.15
Perityphlitis and appendicitis	2	2.89					2	6.76					96	2.34	1	.02	3	.07
Digestive system, others	77	111.11	1	1.44			9	30.41					1,295	31.51	19	.46	7	.17
Total diseases of the digestive system	423	610.39	2	2.88	2	2.89	238	804.06					20,576	500.65	58	1.40	99	2.41
Heart, diseases of	1	1.44	2	2.89									140	3.41	24	.58	3	.07
Arteries and veins	3	4.33											96	2.34	9	.22	2	.05
Total diseases of the circulatory system	4	5.77	2	2.89									236	5.75	33	.80	5	.12
Bronchitis	147	212.12					4	13.51					3,336	81.17	8	.19		
Pneumonia	13	18.76			3	4.33	2	6.76					309	7.52	3	.07	50	1.22
Pleurisy	3	4.33					2	6.76					134	3.26	2	.05		
Respiratory system, others	18	25.97					7	23.65					1,761	42.85	4	.10	3	.07
Total diseases of the respiratory organs	181	261.18			3	4.33	15	50.68					5,540	134.80	17	.41	53	1.29
Kidneys, diseases of	1	1.44											68	1.65	3	.07	7	.17
Varicocele	2	2.89					1	3.38					165	4.01	5	.12		
Genito-urinary, others	6	8.66					5	16.89					557	13.55	10	.24		
Total diseases of the genito-urinary system	9	12.99					6	20.27					790	19.21	18	.43	7	.17
Adenitis	3	4.33					3	10.14					203	4.94	1	.02		
Lymphatic system, others	4	5.77					1	3.38					29	.71	1	.02		
Total diseases of the lymphatic system	7	10.10					4	13.52					232	5.65	2	.04		
Rheumatism, muscular	88	126.98					5	16.89					2,043	49.71	21	.51		
Osteitis and periostitis													55	1.34	3	.07		
Arthritis and synovitis	5	7.22											264	6.42	5	.12		
Rheumatism, chronic articular	14	20.20					1	3.38					427	10.39	25	.61		
Muscles, bones, and joints, others	4	5.77											85	2.07	7	.17		
Total diseases of the muscles, bones, and joints	111	160.17					6	20.27					2,874	69.93	61	1.48		

TABLE V.—*Volunteer Army, 1899—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by arms of the service and the countries in which service was rendered*—Continued.

Causes of admission to sick report.	Engineers.						Signal Corps.						Army.					
Mean strength	693.						296.						41,100.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Total diseases of the integumentary system, all	59	85.14	.....	.....	.....	.....	12	40.54	.....	.....	.....	.....	3,471	84.45	2	0.05	.....	.....
Total diseases of the eye	18	25.97	.....	.....	.....	.....	1	3.38	1	3.38	.....	.....	464	11.29	11	.27	.....	.....
Total diseases of the ear	3	4.33	3	4.33	.....	.....	2	6.76	.....	.....	.....	.....	451	10.97	36	.88	.....	.....
Total diseases of the nose	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	46	1.12	1	.02	.....	.....
Total unclassified	7	10.10	.....	.....	.....	.....	1	3.38	.....	.....	.....	.....	203	4.94	.....	.....	.....	.....
Total for diseases	1,594	2,300.14	10	14.43	8	11.54	452	1,527.03	3	10.14	1	3.38	72,575	1,765.82	453	11.02	419	10.20
Drowning	.....	.....	.....	.....	1	1.44	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	19	.46
Exhaustion from exposure and fatigue	2	2.89	.....	.....	.....	.....	2	6.76	.....	.....	.....	.....	714	17.37	.....	.....	1	.02
Heat stroke	.....	.....	.....	.....	.....	.....	1	3.38	.....	.....	.....	.....	62	1.51	1	.02	.....	.....
Lightning	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.05	.....	.....	.....	.....
Venomous bites, stings, and wounds	10	14.43	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	276	6.71	.....	.....	.....	.....
Abrasions, blisters, burns, and scalds	8	11.54	.....	.....	.....	.....	3	10.14	.....	.....	.....	.....	603	14.67	.....	.....	.....	.....
Compression and concussion of brain	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9	.22	.....	.....	1	.02
Contusions and sprains	43	62.05	.....	.....	.....	.....	8	27.03	.....	.....	.....	.....	1,610	39.17	4	.10	.....	.....
Dislocations	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	66	1.61	.....	.....	.....	.....
Fractures (not shot)	5	7.22	.....	.....	.....	.....	.....	.....	.....	.....	1	3.38	203	4.94	8	.19	3	.07
Herniæ	7	10.10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	317	7.71	29	.71	.....	.....
Wounds, contused, lacerated, and punctured	22	31.75	.....	.....	.....	.....	3	10.14	.....	.....	.....	.....	574	13.96	1	.02	1	.02
Wounds, incised	10	14.43	.....	.....	.....	.....	3	10.14	.....	.....	.....	.....	424	10.32	.....	.....	3	.07
Wounds, gunshot	3	4.33	.....	.....	.....	.....	1	3.38	.....	.....	.....	.....	1,260	30.66	50	1.22	290	7.06
Secondary results of injury	.....	.....	.....	.....	.....	.....	1	3.38	.....	.....	.....	.....	65	1.58	5	.12	.....	.....
Other injuries	4	5.77	.....	.....	.....	.....	1	3.38	.....	.....	.....	.....	176	4.28	2	.05	6	.15
Total for injuries	114	164.50	.....	.....	1	1.44	23	77.70	.....	.....	1	3.38	6,361	154.77	100	2.43	324	7.88
Total for diseases and injuries	1,708	2,464.65	10	14.43	9	12.99	475	1,604.73	3	10.14	2	6.76	78,936	1,920.49	553	13.45	743	18.08

TABLE V.—*Volunteer Army, 1899—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by arms of the service and the countries in which service was rendered*—Continued.

Causes of admission to sick report.	Cuba.						Porto Rico.						Pacific Islands.					
Mean strength	8,082.						380.						16,358.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	6	0.74																
Measles	418	51.72			4	0.49					1	2.63	292	17.85				
Smallpox	4	.49			2	.25	1	2.63					157	9.60			55	3.36
Vaccinia	584	72.26			1	.12							819	50.07				
Influenza	114	14.10					1	2.63					54	3.30				
Dengue	45	5.57											491	30.01				
Mumps	153	18.93											274	16.75				
Diphtheria	1	.12											24	1.47			3	.18
Typhoid fever	176	21.78	1	0.12	22	2.72	8	21.05			1	2.63	301	18.40	6	0.37	36	2.20
Yellow fever	4	.49			1	.12												
Cerebro-spinal fever	2	.25			4	.49							1	.06			1	.06
Malarial fever, intermittent	5,353	662.34	2	.25			98	257.89					4,150	253.70	2	.12		
Malarial fever, remittent	2,797	346.08	3	.37	3	.37	44	115.79					4,096	250.40	2	.12	1	.06
Malarial fever, pernicious	32	3.96			20	2.47	1	2.63					13	.79			5	.31
Malarial cachexia	285	35.26	3	.37	7	.87	2	5.26					95	5.81	2	.12	1	.06
Fever, undetermined	181	22.40											540	33.01				
Erysipelas	3	.37											11	.67			2	.12
Septicæmia and tetanus	1	.12			1	.12							4	.24				
Rheumatic fever	21	2.60	1	.12									77	4.71	1	.06		
Consumption	36	4.45	10	1.24	7	.87	2	5.26			1	2.63	49	3.00	24	1.47	4	.24
Cancer	1	.12											3	.18			1	.06
Syphilis and results	142	17.57	13	1.61			19	50.00					157	9.60	14	.86		
Gonorrhœa and results	488	60.38	2	.25			52	136.84					838	51.23	1	.06		
Chancroid and results	305	37.74					8	21.05					833	50.93				
Infections, others	34	4.21			1	.12	1	2.63					7	.43			2	.12
Total infectious diseases	11,186	1,384.05	35	4.33	73	9.01	237	623.66			3	7.89	13,286	812.21	52	3.18	111	6.77
Anæmia	24	2.97	1	.12									35	2.14				
Nutrition, others	7	.87	1	.12	1	.12	6	15.79					17	1.04	2	.12	1	.06
Total diseases of nutrition	31	3.84	2	.24	1	.12	6	15.79					52	3.18	2	.12	1	.06

TABLE V.—*Volunteer Army, 1899—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by arms of the service and the countries in which service was rendered*—Continued.

Causes of admission to sick report.	Cuba.						Porto Rico.						Pacific Islands.					
Mean strength	8,082.						380.						16,358.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Alcoholism	142	17.57	2	0.25	3	0.37	17	44.74	....	....	....	....	76	4.65	1	0.06	2	0.12
Brain and spinal cord	46	5.69	1	.12	2	.25	2	5.26	1	2.63	....	....	48	2.93	8	.49	2	.12
Insanity	9	1.11	5	.62	....	....	....	....	....	....	....	....	16	.98	3	.18	....	....
Meningitis	2	.25	....	....	1	.12	....	....	....	....	....	....	5	.31	4	.24	4	.24
Poisoning, narcotic	3	.37	1	.12	1	.12	....	....	....	....	....	....	4	.24	....	....	....	....
Nervous system, others	195	24.13	3	.37	....	....	10	26.32	....	....	....	....	511	31.24	7	.43	....	....
Total diseases of the nervous system	397	49.12	12	1.48	7	.86	29	76.32	1	2.63	....	....	660	40.35	23	1.40	8	.48
Poisoning, irritant	10	1.24	....	....	....	....	....	....	....	....	....	....	20	1.22	....	....	1	.06
Tonsillitis, pharyngitis, and sore throat	181	22.40	....	....	....	....	11	28.95	....	....	....	....	358	21.88	....	....	1	.06
Peritonitis	5	.62	....	....	2	.25	1	2.63	....	....	....	....	14	.86	....	....	4	.24
Dyspepsia, colic, and constipation	765	94.66	2	.25	....	....	21	55.26	....	....	....	....	881	53.86	....	....	....	....
Gastritis	167	20.66	....	....	....	....	11	28.95	....	....	....	....	684	41.81	3	.18	....	....
Diarrheal diseases	3,014	372.93	2	.25	19	2.35	72	189.47	....	....	....	....	8,558	523.17	23	1.41	49	3.00
Enteritis	74	9.16	....	....	3	.37	2	5.26	....	....	....	....	209	12.78	1	.06	3	.18
Perityphlitis and appendicitis	18	2.23	....	....	1	.12	1	2.63	....	....	....	....	41	2.51	1	.06	2	.12
Digestive system, others	271	33.53	7	.87	1	.12	9	23.68	....	....	....	....	476	29.10	1	.06	5	.31
Total diseases of the digestive system	4,505	557.42	11	1.37	26	3.21	128	336.83	....	....	....	....	11,241	687.19	29	1.77	65	3.97
Heart, diseases of	23	2.85	9	1.11	1	.12	1	2.63	....	....	....	....	68	4.16	9	.55	2	.12
Arteries and veins	13	1.61	3	.37	....	....	1	2.63	....	....	....	....	50	3.06	2	.12	2	.12
Total diseases of the circulatory system	36	4.46	12	1.48	1	.12	2	5.26	....	....	....	....	118	7.22	11	.67	4	.24
Bronchitis	498	61.62	1	.12	....	....	21	55.26	....	....	....	....	655	40.04	4	.24	....	....
Pneumonia	51	6.31	....	....	11	1.36	2	5.26	....	....	....	....	43	2.63	1	.06	1	.06
Pleurisy	26	3.22	....	....	....	....	2	5.26	....	....	....	....	53	3.24	....	....	....	....
Respiratory system, others	347	42.94	2	.25	1	.12	16	42.10	....	....	....	....	204	12.47	1	.06	1	.06
Total diseases of the respiratory organs	922	114.09	3	.37	12	1.48	41	107.88	....	....	....	....	955	58.38	6	.36	2	.12

Kidneys, diseases of	20	2.47	1	.12	1	12	2	5.26					30	1.83	1	.06	2	.12
Varicocele	37	4.58	1	.12			1	2.63					89	5.44	2	.12		
Genito-urinary, others	132	16.33	3	.37			1	2.63					229	14.00	1	.06		
Total diseases of the genito-urinary system	189	23.38	5	.61	1	12	4	10.52					348	21.27	4	.24	2	.12
Adenitis	33	4.08					5	13.16					93	5.69	1	.06		
Lymphatic system, others	1	.12											19	1.16	1	.06		
Total diseases of the lymphatic system	34	4.20					5	13.16					112	6.85	2	.12		
Rheumatism, muscular	467	57.79	2	.25			12	31.58					659	40.29	7	.43		
Osteitis and periostitis	9	1.11											21	1.28				
Arthritis and synovitis	55	6.81					1	2.63					114	6.97	3	.18		
Rheumatism, chronic articular	105	12.99	3	.37			1	2.63					203	12.41	9	.55		
Muscles, bones, and joints, others	15	1.86	1	.12			1	2.63					32	1.96	6	.37		
Total diseases of the muscles, bones, and joints	651	80.56	6	.74			15	39.47					1,029	62.91	25	1.53		
Total diseases of the integumentary system, all	538	66.56					38	100.00					2,083	127.34	2	.12		
Total diseases of the eye	91	11.26					8	21.05					208	12.72	8	.49		
Total diseases of the ear	53	6.56	6	.74			7	18.42					283	17.30	26	1.59		
Total diseases of the nose	4	.49											5	.31				
Total unclassified	46	5.69					13	34.21					33	2.02				
Total for diseases	18,683	2,311.68	92	11.38	121	14.97	533	1,402.63	1	2.63	3	7.89	30,413	1,859.21	190	11.62	193	11.80
Drowning					2	.25											15	.92
Exhaustion from exposure and fatigue	10	1.24					1	2.63					656	40.10			1	.06
Heat stroke	6	.74											49	3.00	1	.06		
Lightning													2	.12				
Venomous bites, stings, and wounds	63	7.80					12	31.58					155	9.48				
Abrasions, blisters, burns, and scalds	159	19.67					9	23.68					208	12.72				
Compression and concussion of brain	2	.25			1	.12							5	.31				
Contusions and sprains	345	42.69					22	57.89					513	31.36	2	.12		
Dislocations	15	1.86					1	2.63					13	.79				
Fractures (not shot)	31	3.84	1	.12	1	.12	8	21.05					86	5.26	3	.18		
Hernia	54	6.68	5	.62			3	7.89	1	2.63			159	9.72	6	.37		
Wounds, contused, lacerated, and punctured	148	18.31					10	26.32					174	10.64	1	.06		
Wounds, incised	127	15.71			1	.12	3	7.89			1	2.63	125	7.64			1	.06
Wounds, gunshot	23	2.85	2	.25	5	.62	1	2.63					1,158	70.79	40	2.45	275	16.81
Secondary results of injury	15	1.86											22	1.34	1	.06		
Other injuries	53	6.56	1	.12	2	.25	1	2.63					52	3.18			3	.18
Total for injuries	1,051	130.04	9	1.11	12	1.48	71	186.84	1	2.63	1	2.63	3,377	206.44	54	3.30	295	18.03
Total for diseases and injuries	19,734	2,441.72	101	12.50	133	16.46	604	1,589.47	2	5.26	4	10.53	33,790	2,065.65	244	14.92	488	29.83

TABLE V.—*Volunteer Army, 1899—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by arms of the service and the countries in which service was rendered*—Continued.

	Total, islands.						Total, United States.					
Mean strength	24,820.						15,984.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	6	0.24					8	0.50				
Measles	710	28.21			5	0.20	523	32.72			4	0.25
Smallpox	162	6.53			57	2.30	48	3.00			2	.12
Vaccinia	1,403	56.53			1	.04	2,086	130.50				
Influenza	169	6.81					3,058	191.26			4	.25
Dengue	536	21.60					20	1.25				
Mumps	427	17.20					305	19.08				
Diphtheria	25	1.01			3	.12	5	.31			1	.06
Typhoid fever	485	19.54	7	0.28	59	2.38	200	12.51	5	0.31	19	1.19
Yellow fever	4	.16			1	.04						
Cerebro-spinal fever	3	.12			5	.20	8	.50			3	.19
Malarial fever, intermittent	9,601	386.83	4	.16			2,174	136.01				
Malarial fever, remittent	6,937	279.49	5	.20	4	.16	504	31.53			2	.12
Malarial fever, pernicious	46	1.85			25	1.01	7	.44			4	.25
Malarial cachexia	382	15.39	5	.20	8	.32	65	4.07	4	.25		
Fever, undetermined	721	29.05					174	10.89				
Erysipelas	14	.56			2	.08	9	.56				
Septicæmia and tetanus	5	.20			1	.04						
Rheumatic fever	98	3.95	2	.08			31	1.94	1	.06		
Consumption	87	3.51	34	1.37	12	.48	29	1.81	7	.44	4	.25
Cancer	4	.16			1	.04	1	.06				
Syphilis and results	318	12.81	27	1.09			206	12.89	25	1.56		
Gonorrhœa and results	1,378	55.52	3	.12			1,071	67.01	12	.75		
Chancroid and results	1,146	46.17					468	29.28	2	.12		
Infections, others	42	1.69			3	.12	40	2.50	2	.12		
Total infectious diseases	24,709	999.53	87	3.51	187	7.53	11,040	690.62	58	3.61	43	2.68
Anæmia	59	2.38	1	.04			82	5.13	6	.38		
Nutrition, others	30	1.21	3	.12	2	.08	26	1.63	2	.12		
Total diseases of nutrition	89	3.59	4	.16	2	.08	108	6.76	8	.50		

Alcoholism	235	9.47	3	.12	5	.20	87	5.44			
Brain and spinal cord	96	3.87	10	.40	4	.16	57	3.57	2	.12	
Insanity	25	1.01	8	.32			13	.81	11	.69	
Meningitis	7	.28	4	.16	5	.20	16	1.00			6 .38
Poisoning, narcotic	7	.28	1	.04	1	.04	4	.25			1 .06
Nervous system, others	716	28.85	10	.40			316	19.77	6	.38	
Total diseases of the nervous system	1,086	43.75	36	1.45	15	.60	493	30.84	19	1.19	7 .44
Poisoning, irritant	30	1.21			1	.04	74	4.63			1 .06
Tonsillitis, pharyngitis, and sore throat	550	22.16			1	.04	798	49.93			
Peritonitis	20	.81			6	.24	3	.19			
Dyspepsia, colic, and constipation	1,667	67.16	2	.08			1,095	68.51	1	.06	
Gastritis	862	34.73	3	.12			203	12.70	2	.12	
Diarrheal diseases	11,644	469.14	25	1.01	68	2.74	1,658	103.73	3	.19	6 .38
Enteritis	285	11.48	1	.04	6	.24	69	4.32	1	.06	
Perityphlitis and appendicitis	60	2.42	1	.04	3	.12	34	2.13			
Digestive system, others	756	30.46	8	.32	6	.24	530	33.16	11	.69	1 .06
Total diseases of the digestive system	15,874	639.57	40	1.61	91	3.67	4,464	279.27	18	1.12	8 .50
Heart, diseases of	92	3.71	18	.73	3	.12	48	3.00	6	.38	
Arteries and veins	64	2.58	5	.20	2	.08	32	2.00	4	.25	
Total diseases of the circulatory system	156	6.28	23	.93	5	.20	80	5.00	10	.63	
Bronchitis	1,174	47.30	5	.20			2,158	135.01	3	.19	
Pneumonia	96	3.87	1	.04	12	.48	211	13.20	2	.12	38 2.38
Pleurisy	81	3.26					51	3.19	2	.12	
Respiratory system, others	567	22.85	3	.12	2	.08	1,187	74.26	1	.06	1 .06
Total diseases of the respiratory organs	1,918	77.28	9	.36	14	.56	3,607	225.66	8	.49	39 2.40
Kidneys, diseases of	52	2.10	2	.08	3	.12	16	1.00	1	.06	4 .25
Varicocele	127	5.12	3	.12			37	2.31	2	.12	
Genito-urinary, others	362	14.59	4	.16			190	11.89	6	.38	
Total diseases of the genito-urinary system	541	21.80	9	.36	3	.12	243	15.20	9	.56	4 .25
Adenitis	131	5.28	1	.04			69	4.32			
Lymphatic system, others	20	.81	1	.04			8	.50			
Total diseases of the lymphatic system	151	6.08	2	.08			77	4.82			
Rheumatism, muscular	1,138	45.85	9	.36			900	56.31	12	.75	
Osteitis and periostitis	30	1.21					25	1.56	3	.19	
Arthritis and synovitis	170	6.85	3	.12			94	5.88	2	.12	
Rheumatism, chronic articular	309	12.45	12	.48			117	7.32	13	.81	
Muscles, bones, and joints, others	48	1.93	7	.28			37	2.31			
Total diseases of the muscles, bones, and joints	1,695	68.30	31	1.25			1,173	73.38	30	1.87	

TABLE V.—*Volunteer Army, 1899—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by arms of the service and the countries in which service was rendered*—Continued.

Causes of admission to sick report.	Total, islands.						Total, United States.					
Mean strength	24,820.						15,984.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Total diseases of the integumentary system, all	2,659	107.14	2	0.08	.....	.....	800	50.05	.....	.....	.....	.....
Total diseases of the eye	307	12.37	8	.32	.....	.....	156	9.76	2	0.12	.....	.....
Total diseases of the ear	343	13.82	32	1.29	.....	.....	106	6.63	4	.25	.....	.....
Total diseases of the nose	9	.36	.....	.....	.....	.....	37	2.31	1	.06	.....	.....
Total unclassified	92	3.71	.....	.....	.....	.....	110	6.88	.....	.....	.....	.....
Total for diseases	49,629	1,999.57	283	11.40	317	12.77	22,494	1,407.28	167	10.45	101	6.32
Drowning	.....	.....	.....	.....	17	.68	.....	.....	.....	.....	2	.12
Exhaustion from exposure and fatigue	667	26.88	.....	.....	1	.04	45	2.81	.....	.....	.....	.....
Heat stroke	55	2.22	1	.04	.....	.....	6	.38	.....	.....	.....	.....
Lightning	2	.08	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Venomous bites, stings, and wounds	230	9.27	.....	.....	.....	.....	46	2.88	.....	.....	.....	.....
Abrasions, blisters, burns, and scalds	376	15.15	.....	.....	.....	.....	224	14.01	.....	.....	.....	.....
Compression and concussion of brain	7	.28	.....	.....	1	.04	2	.12	.....	.....	.....	.....
Contusions and sprains	880	35.45	2	.08	.....	.....	722	45.17	2	.12	.....	.....
Dislocations	29	1.17	.....	.....	.....	.....	37	2.31	.....	.....	.....	.....
Fractures (not shot)	125	5.04	4	.16	1	.04	78	4.88	4	.25	1	.06
Hernia	216	8.70	12	.48	.....	.....	101	6.32	17	1.06	.....	.....
Wounds, contused, lacerated, and punctured	332	13.38	1	.04	.....	.....	239	14.95	.....	.....	1	.06
Wounds, incised	255	10.27	.....	.....	3	.12	166	10.38	.....	.....	.....	.....
Wounds, gunshot	1,182	47.62	42	1.69	280	11.28	77	4.82	8	.50	10	.62
Secondary results of injury	37	1.49	1	.04	.....	.....	27	1.69	4	.25	.....	.....
Other injuries	106	4.27	1	.04	5	.20	69	4.32	1	.06	1	.06
Total for injuries	4,499	181.27	64	2.58	308	12.41	1,839	115.05	36	2.25	15	.94
Total for diseases and injuries	54,128	2,180.87	347	13.98	625	25.18	24,333	1,522.33	203	12.70	116	7.26

TABLE VI.—*Armies, regular and volunteer, 1899—Admissions to sick report, discharges, and deaths, with their ratios per thousand of mean strength, arranged by arms of the service.*

Causes of admission to sick report.	Cavalry.						Artillery.						Infantry.					
Mean strength	11,870.						11,238.						71,750.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever													15	0.21				
Measles	127	10.70			2	0.17	266	23.67			1	0.09	1,995	27.80	1	0.01	17	0.24
Smallpox	8	.67			1	.08	27	2.40			3	.27	302	4.21			79	1.10
Vaccinia	467	39.34					583	51.88					5,378	74.95	1	.01	1	.01
Influenza	496	41.79					553	49.21					4,129	57.55			4	.06
Dengue	268	22.58					118	10.50					1,127	15.71				
Mumps	112	9.44					92	8.19					1,510	21.05				
Diphtheria	4	.34					6	.53					38	.53			5	.07
Typhoid fever	432	36.40	3	0.25	44	3.71	208	18.51	1	0.09	26	2.31	1,371	19.11	20	.28	171	2.38
Yellow fever	26	2.19			8	.67	34	3.03			7	.62	170	2.37			31	.43
Cerebro-spinal fever	8	.67			4	.34	2	.18			3	.27	17	.66	2	.03	30	.42
Malarial fever, intermittent	7,320	616.68	1	.08			2,967	264.02					29,293	408.26	2	.03		
Malarial fever, remittent	1,831	154.26	1	.08	2	.17	1,113	99.04					13,514	188.34	6	.08	12	.17
Malarial fever, pernicious	31	2.61			4	.34	3	.27			2	.18	109	1.52			52	.72
Malarial cachexia	276	23.25	10	.84	3	.25	117	10.41	5	.44			1,437	20.03	79	1.10	16	.22
Fever, undetermined	412	34.71					167	14.86					1,929	26.88				
Erysipelas	13	1.10					12	1.07			1	.09	57	.79			3	.04
Septicæmia and tetanus	3	.25			2	.17	4	.36					14	.20	1	.01	5	.07
Rheumatic fever	79	6.66	2	.17			61	5.43	2	.18	1	.09	487	6.79	4	.06	1	.01
Consumption	42	3.54	27	2.27	1	.08	61	5.43	39	3.47	4	.36	268	3.74	99	1.38	51	.71
Cancer	5	.42	1	.08			5	.44	2	.18			9	.13	1	.01	2	.03
Syphilis and results	223	18.79	29	2.44			233	20.73	37	3.29			942	13.13	118	1.64		
Gonorrhœa and results	1,415	119.21	9	.76			1,400	124.58	12	1.07			5,080	70.80	30	.42	1	.01
Chancroid and results	545	45.92	2	.17			459	40.84	1	.09			2,898	40.39	8	.11		
Infections, others	66	5.56	1	.08	1	.08	14	1.25	1	.09			181	2.52	4	.06	3	.04
Total infectious diseases	14,209	1,197.08	86	7.25	72	6.07	8,905	756.83	100	8.90	48	4.28	72,300	1,007.67	376	5.23	484	6.73
Anæmia	64	5.39	1	.08			22	1.96	1	.09			386	5.38	11	.15	1	.01
Nutrition, others	23	1.94	4	.34			9	.80	1	.09			78	1.09	14	.20	4	.06
Total diseases of nutrition	87	7.33	5	.42			31	2.76	2	.18			464	6.47	25	.35	5	.07

TABLE VI.—*Armies, regular and volunteer, 1899—Admissions to sick report, discharges, and deaths, with their ratios per thousand of mean strength, arranged by arms of the service*—Continued.

Causes of admission to sick report.	Cavalry.						Artillery.						Infantry.					
Mean strength	11,870.						11,238.						71,750.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Alcoholism	150	12.64	.....	.....	6	0.51	292	25.98	.....	.....	1	0.09	931	12.98	5	0.07	19	0.26
Brain and spinal cord	143	12.05	15	1.26	4	.34	72	6.41	12	1.07	2	.18	390	5.44	65	.91	10	.14
Insanity	22	1.85	9	.76	.....	.....	19	1.69	11	.98	.....	.....	122	1.70	57	.79	.....	.....
Meningitis	2	.17	.....	.....	.....	.....	5	.44	1	.09	2	.18	31	.43	5	.07	14	.20
Poisoning, narcotic	6	.51	1	.08	1	.08	7	.62	.....	.....	1	.09	25	.35	1	.01	10	.14
Nervous system, others	411	34.63	15	1.26	.....	.....	305	27.14	10	.89	.....	.....	1,769	24.65	42	.59	3	.04
Total diseases of the nervous system	734	61.85	40	3.37	11	.93	700	62.28	34	3.03	6	.54	3,268	45.55	175	2.44	56	.78
Poisoning, irritant	23	1.94	.....	.....	.....	.....	11	.98	.....	.....	.....	.....	174	2.42	.....	.....	6	.08
Tonsillitis, pharyngitis, and sore throat	1,031	86.87	.....	.....	.....	.....	720	64.07	.....	.....	1	.09	2,944	41.03	.....	.....	1	.01
Peritonitis	7	.59	.....	.....	1	.08	6	.53	.....	.....	1	.09	31	.43	.....	.....	9	.13
Dyspepsia, colic, and constipation	1,332	112.22	1	.08	.....	.....	1,023	91.04	2	.18	.....	.....	5,212	72.64	7	.10	.....	.....
Gastritis	280	23.59	.....	.....	.....	.....	255	22.69	.....	.....	.....	.....	2,216	30.88	8	.11	5	.07
Diarrheal diseases	4,363	367.57	8	.67	10	.84	3,230	287.42	8	.71	4	.36	31,107	433.55	75	1.05	204	2.84
Enteritis	89	7.50	.....	.....	.....	.....	206	18.33	1	.09	4	.36	743	10.36	5	.07	16	.22
Perityphlitis and appendicitis	36	3.03	3	.25	2	.17	24	2.14	2	.18	1	.09	161	2.24	3	.04	12	.17
Digestive system, others	540	45.49	3	.25	2	.17	489	43.51	6	.53	3	.27	2,328	32.45	33	.46	16	.22
Total diseases of the digestive system	7,701	648.80	15	1.26	15	1.26	5,964	530.71	19	1.69	14	1.26	44,916	626.00	131	1.83	269	3.74
Heart, diseases of	95	8.00	27	2.27	6	.51	65	5.78	15	1.33	5	.44	360	5.02	86	1.20	16	.22
Arteries and veins	29	2.44	6	.51	1	.08	31	2.76	2	.18	.....	.....	173	2.41	22	.31	4	.06
Total diseases of the circulatory system	124	10.44	33	2.78	7	.59	96	8.54	17	1.51	5	.44	533	7.43	108	1.51	20	.28
Bronchitis	1,216	102.44	1	.08	.....	.....	1,132	100.72	1	.09	.....	.....	5,438	75.79	10	.14	.....	.....
Pneumonia	72	6.07	.....	.....	8	.67	42	3.74	.....	.....	5	.44	447	6.23	9	.13	75	1.05
Pleurisy	52	4.38	.....	.....	.....	.....	61	5.43	2	.18	.....	.....	268	3.74	6	.08	2	.03
Respiratory system, others	428	36.06	2	.17	.....	.....	629	55.97	11	.98	1	.09	2,563	35.72	9	.13	8	.11
Total diseases of the respiratory organs	1,768	148.95	3	.25	8	.67	1,864	165.86	14	1.25	6	.53	8,716	121.48	34	.48	85	1.19

Kidneys, diseases of	27	2.27	5	.42	3	.25	25	2.22	1	.09	1	.09	168	2.34	8	.11	21	.29
Varicocele	74	6.23	4	.34			58	5.16	3	.27			267	3.72	10	.14		
Genito-urinary, others	228	19.21	4	.34			166	14.77	4	.36			945	13.17	18	.25		
Total diseases of the genito-urinary system	329	27.71	13	1.10	3	.25	249	22.15	8	.72	1	.09	1,380	19.23	36	.50	21	.29
Adenitis	126	10.61	1	.08			115	10.23					412	5.74	1	.01		
Lymphatic system, others	27	2.27	3	.25			7	.62					54	.75	1	.01		
Total diseases of the lymphatic system	153	12.88	4	.33			122	10.85					466	6.49	2	.02		
Rheumatism, muscular	822	69.26	6	.51			666	59.26	6	.53			3,746	52.21	39	.54		
Osteitis and periostitis	33	2.78					26	2.31	3	.27			127	1.77	4	.06		
Arthritis and synovitis	131	11.04	2	.17			90	8.01	1	.09			607	8.46	14	.20		
Rheumatism, chronic articular	76	6.40	16	1.35			59	5.25	5	.44			739	10.30	66	.92		
Muscles, bones, and joints, others	66	5.56	9	.76			61	5.43	7	.62			182	2.54	30	.42		
Total diseases of the muscles, bones, and joints	1,128	93.04	33	2.79			902	80.26	22	1.95			5,401	75.28	153	2.14		
Total diseases of the integumentary system, all	2,021	170.26	3	.25			1,618	143.98	10	.89			8,844	123.26	6	.08	1	.01
Total diseases of the eye	214	18.03	11	.93			190	16.91	11	.98			882	12.29	36	.50		
Total diseases of the ear	170	14.32	12	1.01			165	14.68	10	.89			926	12.91	62	.86		
Total diseases of the nose	31	2.61	1	.08			27	2.40					78	1.09	2	.03		
Total unclassified	284	23.93	1	.08			53	4.72					407	5.67			1	.01
Total for diseases	28,953	2,439.18	260	21.90	116	9.77	20,486	1,822.92	247	21.98	80	7.12	148,581	2,070.82	1,146	15.97	942	13.13
Drowning					11	.93					8	.71					78	1.09
Exhaustion from exposure and fatigue	76	6.40					85	7.56					1,269	17.69			3	.04
Heat stroke	10	.84					20	1.78					166	2.31	2	.03		
Lightning	2	.17			2	.17							4	.06	1	.01		
Venomous bites, stings, and wounds	141	11.88					126	11.21					541	7.54				
Abrasions, blisters, burns, and scalds	277	23.34					267	23.76					1,085	15.12				
Compression and concussion of brain	9	.76	1	.08			8	.71					15	.21			3	.04
Contusions and sprains	2,230	187.88	4	.34			1,226	109.10					3,314	46.19	7	.10		
Dislocations	43	3.62					44	3.92	1	.09			141	1.97	2	.03		
Fractures (not shot)	157	13.23	6	.51	3	.25	123	10.94	9	.80	3	.27	352	4.91	21	.29	5	.07
Hernia	63	5.31	16	1.35			96	8.54	16	1.42			584	8.14	84	1.17	1	.01
Wounds, contused, lacerated, and punctured	613	51.64					481	42.80					1,175	16.38	2	.03	2	.03
Wounds, incised	214	18.03	1	.08			200	17.80			1	.09	833	11.61	5	.07	19	.26
Wounds, gunshot	133	11.20	23	1.94	37	3.12	156	13.88	13	1.16	35	3.11	1,942	27.07	187	2.61	453	6.31
Secondary results of injury	86	7.25	11	.93			39	3.47	4	.36			222	3.09	18	.25	1	.01
Other injuries	206	17.35	4	.34	1	.08	157	13.98	3	.27	2	.18	405	5.64	9	.13	13	.18
Total for injuries	4,260	358.89	66	5.56	54	4.55	3,028	269.45	46	4.09	49	4.36	12,048	167.92	338	4.71	578	8.06
Total for diseases and injuries	33,213	2,798.06	326	27.46	170	14.32	23,514	2,092.37	293	26.07	129	11.48	160,629	2,238.73	1,484	20.68	1,520	21.19

TABLE VI.—*Armies, regular and volunteer, 1899—Admissions to sick report, discharges, and deaths, with their ratios per thousand of mean strength, arranged by arms of the service*—Continued.

Causes of admission to sick report.	Engineers. Mean strength 1,363.						Ordnance. Mean strength 740.						Signal Corps. Mean strength 719.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Measles	21	15.41			1	0.73							10	13.91				
Smallpox	1	.73											1	1.39				
Vaccinia	63	46.23					7	9.46					11	15.30				
Influenza	114	83.64					71	95.94					1	1.39				
Dengue	17	12.47											6	8.34				
Mumps	8	5.87					1	1.35					3	4.17				
Typhoid fever	16	11.74					2	2.70					28	38.94				
Yellow fever	1	.73			1	.73	1	1.35			1	1.35	5	6.95			2	2.78
Cerebro-spinal fever													1	1.39				
Malarial fever, intermittent	485	355.86	1	0.73			77	104.05					110	152.99				
Malarial fever, remittent	113	82.91			1	.73	8	10.81					95	132.13				
Malarial fever, pernicious							1	1.35					4	5.56				
Malarial cachexia	84	61.63	1	.73			6	8.11					7	9.74				
Fever, undetermined	61	44.76					3	4.05					3	4.17				
Erysipelas	1	.73					1	1.35										
Septicæmia and tetanus	2	1.47																
Rheumatic fever	3	2.20					4	5.41										
Consumption	7	5.14	3	2.20	1	.73							3	4.17	1	1.39		
Cancer							1	1.35			1	1.35	1	1.39				
Syphilis and results	13	9.54					1	1.35					4	5.56	1	1.39		
Gonorrhœa and results	79	57.97					15	20.27					33	45.90	1	1.39		
Chancroid and results	37	27.15											25	34.77				
Infections, others	3	2.20					2	2.70										
Total infectious diseases	1,129	828.38	5	3.66	4	2.92	201	271.60			2	2.70	351	488.16	3	4.17	2	2.78
Anæmia	1	.73					2	2.70										
Nutrition, others	7	5.14	1	.73									1	1.39				
Total diseases of nutrition	8	5.87	1	.73			2	2.70					1	1.39				
Alcoholism	32	23.48					10	13.51			1	1.35	16	22.25				
Brain and spinal cord	7	5.14					8	10.81					1	1.39			1	1.39
Insanity			1	.73			1	1.35	1	1.35								

Meningitis	1	.73			1	.73												
Poisoning, narcotic													1	1.39				
Nervous system, others	45	33.02					18	24.32					9	12.52				
Total diseases of the nervous system	85	62.37	1	.73	1	.73	37	49.99	1	1.35	1	1.35	27	37.55			1	1.39
Poisoning, irritant													2	2.78				
Tonsilitis, pharyngitis, and sore throat	64	46.96					40	54.05					10	13.91				
Peritonitis	3	2.20			2	1.47	1	1.35			1	1.35						
Dyspepsia, colic, and constipation	139	101.98	1	.73			29	39.19					16	22.25				
Gastritis	18	13.21					13	17.57					18	25.04			1	1.39
Diarrheal diseases	386	283.20	1	.73	1	.73	74	100.00					262	364.40			1	1.39
Enteritis	4	2.93											44	61.20				
Perityphlitis and appendicitis	4	2.93					5	6.76					3	4.17				
Digestive system, others	88	64.57	1	.73			32	43.24			1	1.35	12	16.69				
Total diseases of the digestive system	706	517.98	3	2.19	3	2.20	194	262.16			2	2.70	367	510.44			2	2.78
Heart, diseases of	4	2.93	3	2.20			4	5.41			2	2.70	1	1.39				
Arteries and veins	4	2.93																
Total diseases of the circulatory system	8	5.86	3	2.20			4	5.41			2	2.70	1	1.39				
Bronchitis	201	147.47					58	78.37					6	8.34				
Pneumonia	13	9.54			3	2.20	1	1.35					3	4.17				
Pleurisy	4	2.93					1	1.35					3	4.17				
Respiratory system, others	51	37.42					27	36.48					12	16.69				
Total diseases of the respiratory organs	269	197.36			3	2.20	87	117.55					24	33.37				
Kidneys, diseases of	2	1.47	1	.73			2	2.70			1	1.35					1	1.39
Varicocele	4	2.93											1	1.39				
Genito-urinary, others	16	11.74					11	14.86					5	6.95				
Total diseases of the genito-urinary system	22	16.14	1	.73			13	17.56			1	1.35	6	8.34			1	1.39
Adenitis	6	4.40					1	1.35					3	4.17				
Lymphatic system, others	4	2.93											1	1.39				
Total diseases of the lymphatic system	10	7.33					1	1.35					4	5.56				
Rheumatism, muscular	114	83.64					59	79.73					11	15.30				
Osteitis and periostitis	2	1.47											1	1.39				
Arthritis and synovitis	17	12.47					10	13.51	1	1.35			1	1.39				
Rheumatism, chronic articular	17	12.47					5	6.76					2	2.78				
Muscles, bones, and joints, others	8	5.87					2	2.70					3	4.17				
Total diseases of the muscles, bones, and joints	158	115.92					76	102.70	1	1.35			18	25.03				

TABLE VI.—*Armies, regular and volunteer, 1899—Admissions to sick report, discharges, and deaths, with their ratios per thousand of mean strength, arranged by arms of the service*—Continued.

Causes of admission to sick report.	Engineers.						Ordnance.						Signal Corps.					
Mean strength	1,363.						740.						719.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Total diseases of the integumentary system, all	126	92.45					23	31.08					31	43.12				
Total diseases of the eye	35	25.68	1	0.73			18	24.32					8	11.13	1	1.39		
Total diseases of the ear	9	6.60	4	2.93			3	4.05					5	6.95				
Total diseases of the nose							2	2.70										
Total unclassified	7	5.14											1	1.39				
Total for diseases	2,572	1,887.02	19	13.94	11	8.07	661	893.24	2	2.70	8	10.81	844	1,173.85	4	5.56	6	8.34
Drowning					1	.73												
Exhaustion from exposure and fatigue	10	7.34											4	5.56				
Heat stroke	3	2.20					1	1.35					1	1.39				
Venomous bites, stings, and wounds	15	11.01					3	4.05										
Abrasions, blisters, burns, and scalds	17	12.47					5	6.76					4	5.56				
Compression and concussion of brain							1	1.35					2	2.78			1	1.39
Contusions and sprains	96	70.44					53	71.62					11	15.30				
Dislocations	1	.73																
Fractures (not shot)	10	7.34					4	5.41			1	1.35	1	1.39			1	1.39
Hernia	9	6.60					4	5.41					1	1.39	1	1.39		
Wounds, contused, lacerated, and punctured	40	29.35					17	22.97	1	1.35			5	6.95				
Wounds, incised	15	11.01					7	9.46					4	5.56				
Wounds, gunshot	5	3.67					1	1.35					4	5.56			1	1.39
Secondary results of injury													1	1.39				
Other injuries	12	8.80					3	4.05					2	2.78				
Total for injuries	233	170.95			1	.73	99	133.78	1	1.35	1	1.35	40	55.63	1	1.39	3	4.17
Total for diseases and injuries	2,805	2,057.97	19	13.94	12	8.80	760	1,027.03	3	4.05	9	12.16	884	1,229.48	5	6.95	9	12.52

TABLE VI. *Armies, regular and volunteer, 1899—Admissions to sick report, discharges, and deaths, with their ratios per thousand of mean strength, arranged by arms of the service*—Continued.

Causes of admission to sick report.	Medical.						Others.					
Mean strength	4,300.						3,566.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	5	1.16					2	0.56				
Measles	94	21.86					242	67.87	2	0.56	16	4.49
Smallpox	6	1.40			1	0.23	2	.56				
Vaccinia	58	13.49					328	91.98				
Influenza	192	44.65					74	20.75			1	.28
Dengue	66	15.35										
Mumps	33	7.67					80	22.44				
Diphtheria	6	1.40					4	1.12				
Typhoid fever	100	23.26			13	3.02	27	7.57			4	1.12
Yellow fever	20	4.65			4	.93	5	1.40			1	.28
Cerebro-spinal fever							6	1.68	1	.28	4	1.12
Malarial fever, intermittent	683	158.84					349	97.87				
Malarial fever, remittent	488	113.49			1	.23	40	11.22				
Malarial fever, pernicious	2	.47										
Malarial cachexia	46	10.70	5	1.16	1	.23	18	5.05	5	1.40		
Fever, undetermined	81	18.84					33	9.25				
Erysipelas	5	1.16					3	.84				
Septicæmia and tetanus	2	.47			1	.23						
Rheumatic fever	39	9.07					25	7.01	1	.28	1	.28
Consumption	26	6.05	16	3.72			13	3.65	5	1.40		
Cancer	1	.23					1	.28				
Syphilis and results	36	8.37	14	3.26			24	6.73	6	1.68		
Gonorrhœa and results	251	58.37	3	.70			195	54.68	3	.84		
Chancroid and results	80	18.61	1	.23			50	14.02	1	.28		
Infections, others	6	1.40					12	3.37				
Total infectious diseases	2,326	540.96	39	9.07	21	4.87	1,533	429.90	24	6.72	27	7.57
Anæmia	8	1.86	2	.47			5	1.40				
Nutrition, others	4	.93					4	1.12	1	.28		
Total diseases of nutrition	12	2.79	2	.47			9	2.52	1	.28		
Alcoholism	58	13.49	2	.47	1	.23	40	11.22			1	.28
Brain and spinal cord	20	4.65	4	.93	1	.23	24	6.73	4	1.12	2	.56
Insanity	14	3.26	8	1.86			10	2.80	5	1.40		
Meningitis	1	.23					2	.56				

TABLE VI.—*Armies, regular and volunteer, 1899—Admissions to sick report, discharges, and deaths, with their ratios per thousand of mean strength, arranged by arms of the service*—Continued.

Causes of admission to sick report.	Medical.						Others.					
Mean strength	4,300.						3,566.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Poisoning, narcotic	8	1.86	4	0.93	1	0.23						
Nervous system, others	123	28.61	7	1.63			33	9.25	3	0.84		
Total diseases of the nervous system	224	52.10	25	5.82	3	.69	109	30.56	12	3.36	3	0.84
Poisoning, irritant	5	1.16					1	.28				
Tonsillitis, pharyngitis, and sore throat	157	36.51					155	43.47				
Peritonitis	1	.23					1	.28				
Dyspepsia, colic, and constipation	187	43.49					140	39.26				
Gastritis	137	31.86	1	.23			30	8.41	1	.28		
Diarrheal diseases	629	146.28	3	.70	6	1.40	129	36.18				
Enteritis	29	6.74					9	2.52				
Perityphlitis and appendicitis	19	4.42					8	2.24	2	.56	1	.28
Digestive system, others	82	19.07	3	.70	3	.70	92	25.80	2	.56		
Total diseases of the digestive system	1,246	289.76	7	1.63	9	2.10	565	158.44	5	1.40	1	.28
Heart, diseases of	18	4.19	9	2.09	2	.47	13	3.65	5	1.40		
Arteries and veins	6	1.40	2	.47			6	1.68	2	.56		
Total diseases of the circulatory system	24	5.59	11	2.56	2	.47	19	5.33	7	1.96		
Bronchitis	158	36.75					166	46.55				
Pneumonia	19	4.42			2	.47	32	8.97			6	1.68
Pleurisy	11	2.56					14	3.93	1	.28		
Respiratory system, others	64	14.88	1	.23			36	10.09	2	.56	1	.28
Total diseases of the respiratory organs	252	58.61	1	.23	2	.47	248	69.54	3	.84	7	1.96
Kidneys, diseases of	12	2.79	4	.93			7	1.96			1	.28
Varicocele	11	2.56					8	2.24				
Genito-urinary, others	35	8.14					15	4.21	1	.28		
Total diseases of the genito-urinary system	58	13.49	4	.93			30	8.41	1	.28	1	.28

Adenitis	16	3.72					9	2.52				
Lymphatic system, others	3	.70					2	.56				
Total diseases of the lymphatic system	19	4.42					11	3.08				
Rheumatism, muscular	91	21.16					109	30.57	5	1.40		
Osteitis and periostitis	7	1.63					4	1.12	1	.28		
Arthritis and synovitis	18	4.19	1	.23			9	2.52				
Rheumatism, chronic articular	39	9.07	6	1.40			12	3.37	2	.56		
Muscles, bones, and joints, others	11	2.56					5	1.40				
Total diseases of the muscles, bones, and joints	166	38.61	7	1.63			139	38.98	8	2.24		
Total diseases of the integumentary system, all	196	45.58					123	34.49				
Total diseases of the eye	38	8.84	5	1.16			42	11.78	4	1.12		
Total diseases of the ear	28	6.51	1	.23	2	.47	22	6.17	3	.84		
Total diseases of the nose	4	.93					1	.28				
Total unclassified	11	2.56					18	5.05				
Total for diseases	4,604	1,070.70	102	23.72	39	9.07	2,869	804.54	68	19.07	39	10.94
Drowning					1	.23						
Exhaustion from exposure and fatigue	27	6.28					5	1.40				
Heat-stroke	3	.70										
Lightning	1	.23										
Venomous bites, stings, and wounds	7	1.63					1	.28				
Abrasions, blisters, burns, and scalds	24	5.58					28	7.85				
Compression and concussion of brain	4	.93			1	.23	1	.28				
Contusions and sprains	108	25.12					120	33.65				
Dislocations	7	1.63					7	1.96	1	.28		
Fractures (not shot)	12	2.79			1	.23	12	3.37	2	.56		
Hernia	28	6.51	5	1.16			20	5.61	3	.84		
Wounds, contused, lacerated, and punctured	18	4.19					45	12.62				
Wounds, incised	19	4.42			1	.23	23	6.45				
Wounds, gunshot	25	5.81	1	.23	10	2.33	10	2.80	2	.56	2	.56
Secondary results of injury	7	1.63	2	.47			11	3.08	2	.56		
Other injuries	17	3.95			1	.23	17	4.77	2	.56	1	.28
Total for injuries	307	71.40	8	1.86	15	3.49	300	84.13	12	3.37	3	.84
Total for diseases and injuries	4,911	1,142.10	110	25.58	54	12.56	3,169	888.67	80	22.44	42	11.78

TABLE VII.—*Armies, regular and volunteer, 1899—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by the countries in which service was rendered.*

Causes of admission to sick report.	Cuba.						Porto Rico.						Pacific Islands.					
Mean strength	20,051.						3,727.						39,280.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	8	0.40																
Measles	546	27.23			5	0.25	61	16.37			1	0.27	767	19.53			1	0.03
Smallpox	5	.25			3	.15	7	1.88					267	6.80			78	1.99
Vaccinia	869	43.34			1	.05	191	51.25					1,354	34.47	1	0.03		
Influenza	173	8.63					22	5.90					271	6.90				
Dengue	84	4.19					73	19.59					1,421	36.18				
Mumps	227	11.32					18	4.83					901	22.94				
Diphtheria	2	.10					1	.27					32	.81			4	.10
Typhoid fever	790	39.40	2	0.10	85	4.24	56	15.03			10	2.68	862	21.95	9	.23	118	3.00
Yellow fever	247	12.32			51	2.54												
Cerebro-spinal fever	7	.35			10	.50	1	.27					17	.43	1	.03	6	.15
Malarial fever, intermittent	14,636	729.94	2	.10			1,289	345.85					15,273	388.82	2	.05		
Malarial fever, remittent	6,667	332.51	4	.20	5	.25	375	100.62					8,502	216.45	2	.05	8	.20
Malarial fever, pernicious	79	3.94			35	1.75	4	1.07					45	1.15			18	.46
Malarial cachexia	643	32.07	10	.50	10	.50	41	11.00					705	17.95	14	.36	9	.23
Fever, undetermined	837	41.75					45	12.07					1,455	37.04				
Erysipelas	10	.50					1	.27					30	.76			4	.10
Septicæmia and tetanus	6	.30			4	.20	4	1.07			3	.80	7	.18	1	.03	1	.03
Rheumatic fever	126	6.28	2	.10			50	13.42					327	8.32	1	.03	2	.05
Consumption	90	4.49	40	1.99	8	.40	19	5.10	4	1.07	3	.80	176	4.48	60	1.53	31	.79
Cancer	6	.30	2	.10			1	.27					11	.28	1	.03	2	.05
Syphilis and results	332	16.56	41	2.04			114	30.59	16	4.29			461	11.74	43	1.09		
Gonorrhœa and results	1,763	87.92	9	.45	1	.05	636	170.64	5	1.34			2,372	60.39	6	.15		
Chancroid and results	890	44.39	4	.20			317	85.06					1,754	44.65	1	.03		
Infections, others	46	2.29			1	.05	8	2.15					48	1.22	1	.03	2	.05
Total infectious diseases	29,089	1,450.77	116	5.78	219	10.93	3,334	894.57	25	6.70	17	4.55	37,058	943.44	143	3.64	284	7.23
Anæmia	90	4.49	2	.10			13	3.49					223	5.68	1	.03	1	.03
Nutrition, others	16	.80	6	.30	3	.15	12	3.22					46	1.17	3	.08	1	.03
Total diseases of nutrition	106	5.29	8	.40	3	.15	25	6.71					269	6.85	4	.11	2	.06
Alcoholism	528	26.33	3	.15	9	.45	184	49.37					247	6.29	3	.08	8	.20

Brain and spinal cord	164	8.18	12	.60	5	.25	37	9.93	6	1.61	1	.27	232	5.91	26	.66	9	.23
Insanity	32	1.60	24	1.20			14	3.76	2	.54			84	2.14	16	.41		
Meningitis	6	.30			1	.05	1	.27	1	.27			11	.28	4	.10	6	.15
Poisoning, narcotic	11	.55	1	.05	5	.25	2	.54	1	.27			15	.38	3	.08	4	.10
Nervous system, others	564	28.13	14	.70			123	33.00					1,073	27.32	21	.53	3	.08
Total diseases of the nervous system	1,305	65.09	54	2.70	20	1.00	361	96.87	10	2.69	1	.27	1,662	42.32	73	1.86	30	.76
Poisoning, irritant	66	3.29			2	.10	10	2.68					48	1.22			2	.05
Tonsillitis, pharyngitis, and sore throat	509	25.39					113	30.32					915	23.29			2	.05
Peritonitis	10	.50			4	.20	3	.80			1	.27	18	.46			5	.13
Dyspepsia, colic, and constipation	1,995	99.49	2	.10			271	72.71					2,455	62.50	2	.05		
Gastritis	583	29.08			1	.05	174	46.69					1,672	42.57	4	.10	5	.13
Diarrheal diseases	8,709	434.35	10	.50	29	1.45	2,023	542.80	6	1.61	10	2.68	25,249	642.80	62	1.58	180	4.58
Enteritis	210	10.47			4	.20	43	11.54	1	.27	2	.54	677	17.23	4	.10	12	.31
Perityphlitis and appendicitis	52	2.59			8	.40	10	2.68					93	2.37	2	.05	7	.18
Digestive system, others	777	38.75	13	.65	6	.30	188	50.44					1,334	33.96	8	.20	13	.33
Total diseases of the digestive system	12,911	643.91	25	1.25	54	2.70	2,835	760.66	7	1.88	13	3.49	32,461	826.40	82	2.09	226	5.76
Heart, diseases of	133	6.63	40	1.99	4	.20	27	7.24	6	1.61	1	.27	223	5.68	43	1.09	13	.33
Arteries and veins	53	2.64	5	.25	1	.05	8	2.15	1	.27			106	2.70	9	.23	3	.08
Total diseases of the circulatory system	186	9.27	45	2.24	5	.25	35	9.39	7	1.88	1	.27	329	8.38	52	1.32	16	.41
Bronchitis	1,036	51.67	1	.05			168	45.08					1,786	45.47	5	.13		
Pneumonia	79	3.94			20	1.00	10	2.68			1	.27	137	3.49	2	.05	19	.48
Pleurisy	61	3.04			1	.05	14	3.76					155	3.95	3	.08	1	.03
Respiratory system, others	645	32.17	5	.25	2	.10	121	32.47					464	11.81	7	.18	5	.13
Total diseases of the respiratory organs	1,821	90.82	6	.30	23	1.15	313	83.99			1	.27	2,542	64.72	17	.43	25	.64
Kidneys, diseases of	51	2.54	3	.15	4	.20	13	3.49					104	2.65	3	.08	17	.43
Varicocele	111	5.54	3	.15			29	7.78	1	.27			183	4.66	5	.13		
Genito-urinary, others	341	17.01	7	.35			76	20.39	1	.27			474	12.07	3	.08		
Total diseases of the genito-urinary system	503	25.09	13	.65	4	.20	118	31.66	2	.54			761	19.38	11	.28	17	.43
Adenitis	108	5.39					107	28.71					257	6.54	1	.03		
Lymphatic system, others	26	1.30	3	.15			14	3.76					29	.74	1	.03		
Total diseases of the lymphatic system	134	6.69	3	.15			121	32.47					286	7.28	2	.05		
Rheumatism, muscular	1,084	54.06	4	.20			245	65.74	3	.80			1,840	46.84	14	.36		
Osteitis and periostitis	47	2.34	2	.10			16	4.29	1	.27			56	1.43				
Arthritis and synovitis	195	9.73					41	11.00					287	7.31	8	.20		
Rheumatism, chronic articular	159	7.93	13	.65			15	4.02	2	.54			496	12.63	34	.87		
Muscles, bones, and joints, others	56	2.79	8	.40			21	5.63	1	.27			106	2.70	16	.41		
Total diseases of the muscles, bones, and joints	1,541	76.85	27	1.35			338	90.68	7	1.88			2,785	70.91	72	1.83		

TABLE VII.—*Armies, regular and volunteer, 1899—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by the countries in which service was rendered*—Continued.

Causes of admission to sick report.	Cuba.						Porto Rico.						Pacific Islands.					
Mean strength	20,051.						3,727.						39,280.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Total diseases of the integumentary system, all	2,420	120.69	2	0.10			806	216.26					6,991	177.98	5	0.13	1	0.03
Total diseases of the eye	298	14.86	7	.35			48	12.88	3	0.80			529	13.47	19	.48		
Total diseases of the ear	202	10.07	20	1.00			38	10.19	1	.27			743	18.92	36	.92		
Total diseases of the nose	35	1.75					2	.54					18	.46	1	.03		
Total unclassified	338	16.86					34	9.12			1	.27	232	5.91				
Total for diseases	50,889	2,537.98	326	16.26	328	16.36	8,408	2,255.97	62	16.63	34	9.12	86,666	2,206.36	517	13.16	601	15.30
Drowning					9	.45					1	.27					78	1.99
Exhaustion from exposure and fatigue	46	2.29					5	1.34					1,331	33.89			3	.08
Heat stroke	71	3.54											120	3.06	2	.05		
Lightning	3	.15	1	.05	2	.10							4	.10				
Venomous bites, stings, and wounds	261	13.02					145	38.91					335	8.53				
Abrasions, blisters, burns, and scalds	465	23.19					68	18.25					543	13.82				
Compression and concussion of brain	7	.35			3	.15	6	1.61					9	.23				
Contusions and sprains	1,741	86.83	1	.05			397	106.52					1,317	33.53	5	.13		
Dislocations	61	3.04					17	4.56					52	1.32	1	.03		
Fractures (not shot)	129	6.43	8	.40	1	.05	64	17.17	2	.54	2	.54	188	4.79	10	.25		
Hernia	156	7.78	34	1.70			38	10.19	8	2.15			382	9.72	35	.89	1	.03
Wounds, contused, lacerated, and punctured	637	31.77					120	32.20					476	12.12	2	.05	1	.03
Wounds, incised	363	18.10	1	.05	4	.20	49	13.15			3	.80	350	8.91	1	.03	14	.36
Wounds, gunshot	60	2.99	16	.80	16	.80	20	5.37			2	.54	2,053	52.26	118	3.00	495	12.60
Secondary results of injury	89	4.44	18	.90			19	5.10	1	.27			109	2.77	6	.15	1	.03
Other injuries	157	7.83	1	.05	4	.20	45	12.07	1	.27			161	4.10	3	.08	7	.18
Total for injuries	4,246	211.76	80	3.99	39	1.94	993	266.43	12	3.22	8	2.15	7,430	189.16	183	4.66	600	15.28
Total for diseases and injuries	55,135	2,749.74	406	20.25	367	18.30	9,401	2,522.40	74	19.85	42	11.27	94,096	2,395.52	700	17.82	1,201	30.58

of mean strength, arranged by the countries in which service was rendered—Continued.

Causes of admission to sick report.	Total, islands.						United States.					
Mean strength	63,058.						42,192.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number	Ratio.
Scarlet fever	8	0.13					14	0.33				
Measles	1,374	21.79			7	0.11	1,376	32.61	3	0.07	30	0.71
Smallpox	279	4.42			81	1.28	67	1.59			3	.07
Vaccinia	2,414	38.28	1	0.02	1	.02	4,470	105.94				
Influenza	466	7.39					5,164	122.39			5	.12
Dengue	1,578	25.03					24	.57				
Mumps	1,146	18.17					693	16.42				
Diphtheria	35	.56			4	.06	23	.55			1	.02
Typhoid fever	1,708	27.09	11	.17	213	3.38	458	10.85	13	.31	45	1.07
Yellow fever	247	3.92			51	.81	14	.33			3	.07
Cerebro-spinal fever	25	.40	1	.02	16	.25	38	.90	2	.05	25	.60
Malarial fever, intermittent	31,198	494.76	4	.06			10,035	237.84				
Malarial fever, remittent	15,544	246.50	6	.10	13	.21	1,619	38.37	1	.02	3	.07
Malarial fever, pernicious	128	2.03			53	.84	21	.50			5	.12
Malarial cachexia	1,389	22.03	24	.38	19	.30	598	14.17	81	1.92	1	.02
Fever, undetermined	2,337	37.06					352	8.34				
Erysipelas	41	.65			4	.06	51	1.21				
Septicæmia and tetanus	17	.27	1	.02	8	.13	8	.19				
Rheumatic fever	503	7.98	3	.05	2	.03	195	4.62	6	.14	1	.02
Consumption	285	4.52	104	1.65	42	.67	134	3.18	85	2.01	15	.36
Cancer	18	.29	3	.05	2	.03	4	.09	1	.02	1	.02
Syphilis and results	907	14.38	100	1.59			569	13.49	105	2.49		
Gonorrhœa and results	4,771	75.66	20	.32	1	.02	3,683	87.29	37	.88		
Chancroid and results	2,961	46.96	5	.08			1,121	26.57	8	.19		
Infections, others	102	1.62	1	.02	3	.05	182	4.31	5	.12	1	.02
Total infectious diseases	69,481	1,101.89	284	4.53	520	8.25	30,913	732.67	347	8.22	139	3.29
Anæmia	326	5.17	3	.05	1	.02	162	3.84	12	.28		
Nutrition, others	74	1.17	9	.14	4	.06	52	1.23	12	.28		
Total diseases of nutrition	400	6.34	12	.19	5	.08	214	5.07	24	.56		
Alcoholism	959	15.21	6	.10	17	.27	568	13.46	1	.02	12	.28
Brain and spinal cord	433	6.87	44	.70	15	.24	232	5.50	56	1.33	5	.12
Insanity	130	2.06	42	.67			58	1.37	50	1.19		
Meningitis	18	.29	5	.08	7	.11	24	.57	1	.02	10	.24

TABLE VII.—*Armies, regular and volunteer, 1899—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by the countries in which service was rendered*—Continued.

Causes of admission to sick report.	Total, islands.						United States.					
Mean strength	63,058.						42,192.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Poisoning, narcotic	28	0.44	5	0.08	9	0.14	18	0.43	1	0.02	4	0.07
Nervous system, others	1,760	27.91	35	.56	3	.05	949	22.49	42	1.00	.....	.....
Total diseases of the nervous system	3,328	52.78	137	2.19	51	.81	1,849	43.82	151	3.58	31	.71
Poisoning, irritant	124	1.97	.....	.....	4	.06	90	2.13	.....	.....	2	.05
Tonsillitis, pharyngitis, and sore throat	1,537	24.37	.....	.....	2	.03	3,580	84.85	.....	.....	.....	.....
Peritonitis	31	.49	.....	.....	10	.16	19	.45	.....	.....	4	.09
Dyspepsia, colic, and constipation	4,721	74.87	4	.06	.....	.....	3,347	79.33	7	.17	.....	.....
Gastritis	2,429	38.52	4	.06	6	.10	532	12.61	6	.14	.....	.....
Diarrheal diseases	35,981	570.60	78	1.24	219	3.47	4,027	95.45	17	.40	7	.17
Enteritis	930	14.75	5	.08	18	.29	161	3.82	1	.02	2	.05
Perityphlitis and appendicitis	155	2.46	2	.03	15	.24	103	2.44	8	.19	1	.02
Digestive system, others	2,299	36.46	21	.33	19	.30	1,355	32.12	27	.64	6	.14
Total diseases of the digestive system	48,207	764.49	114	1.80	293	4.65	13,214	313.19	66	1.56	22	.52
Heart, diseases of	383	6.07	89	1.41	18	.29	177	4.20	56	1.33	13	.31
Arteries and veins	167	2.65	15	.24	4	.06	82	1.94	19	.45	1	.02
Total diseases of the circulatory system	550	8.72	104	1.65	22	.35	259	6.14	75	1.78	14	.33
Bronchitis	2,990	47.42	6	.10	.....	.....	5,381	127.54	6	.14	.....	.....
Pneumonia	226	3.58	2	.03	40	.63	401	9.50	7	.17	59	1.40
Pleurisy	230	3.65	3	.05	2	.03	182	4.31	6	.14	.....	.....
Respiratory system, others	1,230	19.51	12	.19	7	.11	2,573	60.98	13	.31	3	.07
Total diseases of the respiratory organs	4,676	74.16	23	.37	49	.77	8,537	202.34	32	.76	62	1.47
Kidneys, diseases of	168	2.66	6	.10	21	.33	75	1.78	13	.31	7	.17
Varicocele	323	5.12	9	.14	.....	.....	99	2.35	8	.19	.....	.....
Genito-urinary, others	891	14.13	11	.17	.....	.....	525	12.44	16	.38	.....	.....
Total diseases of the genito-urinary system	1,382	21.91	26	.41	21	.33	699	16.57	37	.88	7	.17

Lymphatic system, others	69	1.09	1	.06			28	.66				
Total diseases of the lymphatic system	541	8.58	5	.08			241	5.71	1	.02		
Rheumatism, muscular	3,169	50.26	21	.33			2,444	57.93	35	.83		
Osteitis and periostitis	119	1.89	3	.05			81	1.92	5	.12		
Arthritis and synovitis	523	8.29	8	.13			360	8.53	11	.26		
Rheumatism, chronic articular	670	10.63	49	.78			278	6.59	46	1.09		
Muscles, bones, and joints, others	183	2.90	25	.40			155	3.67	21	.50		
Total diseases of the muscles, bones, and joints	4,664	73.97	106	1.69			3,318	78.65	118	2.80		
Total diseases of the integumentary system, all	10,217	162.03	7	.11	1	.02	2,753	65.25	12	.28		
Total diseases of the eye	875	13.88	29	.46			551	13.06	39	.92		
Total diseases of the ear	983	15.59	57	.90			343	8.13	35	.83	2	.05
Total diseases of the nose	55	.87	1	.02			88	2.09	2	.05		
Total unclassified	604	9.58			1	.02	176	4.17	1	.02		
Total for diseases	145,963	2,314.74	905	14.35	963	15.27	63,155	1,496.84	940	22.28	277	6.56
Drowning					88	1.40						
Exhaustion from exposure and fatigue	1,382	21.92			3	.05	92	2.18				
Heatstroke	191	3.03	2	.03			12	.28				
Lightning	7	.11	1	.02	2	.03						
Venomous bites, stings, and wounds	741	11.75					93	2.20				
Abrasions, blisters, burns, and scalds	1,076	17.06					628	14.88				
Compression and concussion of brain	22	.35			3	.05	18	.43	1	.02	2	.05
Contusions and sprains	3,455	54.79	6	.10			3,693	87.58	5	.12		
Dislocations	130	2.06	1	.02			113	2.68	3	.07		
Fractures (not shot)	381	6.04	20	.32	3	.05	290	6.87	18	.43	10	.24
Hernia	576	9.13	77	1.22	1	.02	229	5.43	48	1.14		
Wounds, contused, lacerated, and punctured	1,233	19.55	2	.03	1	.02	1,158	27.45	1	.02	1	.02
Wounds, incised	762	12.08	2	.03	21	.33	550	13.04	4	.09		
Wounds, gunshot	2,133	33.83	134	2.13	513	8.14	142	3.37	92	2.18	25	.59
Secondary results of injury	217	3.44	25	.40	1	.02	148	3.51	12	.28		
Other injuries	363	5.76	5	.08	11	.17	455	10.78	13	.31	7	.17
Total for injuries	12,669	200.91	275	4.36	647	10.26	7,623	180.67	197	4.67	56	1.33
Total for diseases and injuries	158,632	2,515.65	1,180	18.71	1,610	25.53	70,778	1,677.51	1,137	26.95	333	7.89

TABLE VIII.—*Armies, regular and volunteer, 1898 and 1899—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, as compared with the corresponding ratios of the Regular Army for the decade 1888–1897.*

	Decade 1888–1897.											
	White troops.						Colored troops.					
can strength	24,548.						2,342.					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	49	0.20										
Measles	1,453	5.92			1	0.004	64	2.73				
Smallpox	21	.09			3	.01	4	.17				
Vaccinia	7,913	32.24	1	0.004			553	23.61				
Influenza	14,228	57.96			43	.18	1,766	75.41			4	0.17
Dengue	970	3.95										
Mumps	1,154	4.70					193	8.24				
Diphtheria	124	.51			2	.01	21	.90				
Typhoid fever	1,273	5.19	3	.01	138	.56	69	2.95			10	.43
Yellow fever	7	.03			3	.01						
Cerebro-spinal fever	12	.05	1	.004	5	.02	1	.04				
Malarial fever, intermittent	16,353	66.62					598	25.53				
Malarial fever, remittent	3,572	14.55			13	.05	272	11.61			6	.26
Malarial fever, pernicious	14	.06			6	.02	4	.17			2	.09
Malarial cachexia	644	2.66	16	.07	1	.004	82	3.50	1	0.04		
Fever, undetermined	2,908	11.85					3.42	14.60				
Erysipelas	446	1.82			14	.06	21	.90			3	.13
Septicæmia and tetanus	10	.04			10	.04	1	.04			1	.04
Rheumatic fever	1,180	4.81	12	.05	2	.01	107	4.57				
Consumption	601	2.45	340	1.39	100	.41	83	3.54	42	1.79	24	1.02
Cancer	50	.20	7	.03	28	.11	4	.17	1	.04	1	.04
Syphilis and results	3,420	13.93	320	1.30	6	.02	392	16.74	61	2.60	1	.04
Gonorrhea and results	11,054	45.06	59	.24			942	40.23	2	.09		
Chancroid and results	2,750	11.20	2	.01			378	16.14				
Infections, others	563	2.29	19	.08	12	.05	40	1.71	2	.09	1	.04
Total infectious diseases	70,769	288.29	780	3.18	387	1.58	5,937	253.50	109	4.65	53	2.26
Anæmia	198	.81	13	.05	1	.004	11	.47	2	.09		
Nutrition, others	300	1.22	102	.42	10	.04	26	1.11	10	.43	1	.04
Total diseases of nutrition	498	2.03	115	.47	11	.04	37	1.58	12	.51	1	.04

Alcoholism	8,568	34.91	11	.04	58	.24	114	4.87	1	.04	.....	.....
Brain and spinal cord	1,237	5.04	188	.77	63	.26	84	3.59	14	.60	7	.30
Insanity	301	1.23	267	1.09	8	.03	16	.68	14	.60	1	.04
Meningitis	5	.02	.....	.....	2	.01	.....	.....	.....	.....	.....	.....
Poisoning, narcotic	141	.57	14	.06	12	.05	5	.21	1	.04	.....	.....
Nervous system, others	8,401	34.23	155	.63	4	.02	1,099	46.92	6	.26	.....	.....
Total diseases of the nervous system	18,653	75.99	635	2.59	147	.60	1,318	56.28	36	1.54	8	.34
Poisoning, irritant	238	.97	.....	.....	51	.21	8	.34	.....	.....	1	.04
Tonsillitis, pharyngitis, and sore throat	15,757	64.19	2	.01	1	.004	1,813	77.41	.....	.....	.....	.....
Peritonitis	59	.24	5	.02	20	.08	2	.09	.....	.....	.....	.....
Dyspepsia, colic, and constipation	12,487	50.87	32	.13	1	.004	1,540	65.75	5	.21	.....	.....
Gastritis	796	3.24	22	.09	12	.05	59	2.52	2	.09	2	.09
Diarrheal diseases	22,827	92.99	35	.14	15	.06	1,770	75.58	3	.13	2	.09
Enteritis	431	1.76	5	.02	16	.07	29	1.24	.....	.....	.....	.....
Perityphlitis and appendicitis	122	.50	3	.01	10	.04	13	.56	.....	.....	2	.09
Digestive system, others	7,046	28.71	54	.22	51	.21	859	36.68	6	.26	3	.13
Total diseases of the digestive system	59,763	243.46	158	.64	177	.72	6,093	260.17	16	.69	10	.44
Heart, diseases of	1,134	4.62	292	1.19	84	.34	87	3.72	24	1.02	6	.26
Arteries and veins	316	1.29	84	.34	23	.09	14	.60	2	.09	8	.34
Total diseases of the circulatory system	1,450	5.91	376	1.53	107	.44	101	4.31	26	1.11	14	.60
Bronchitis	15,420	62.87	49	.20	4	.02	1,528	65.24	2	.09	.....	.....
Pneumonia	832	3.39	12	.05	140	.57	153	6.53	2	.09	29	1.24
Pleurisy	478	1.95	15	.06	6	.02	72	3.07	1	.04	1	.04
Respiratory system, others	6,773	27.59	45	.18	14	.06	738	31.51	2	.09	4	.17
Total diseases of the respiratory organs	23,503	95.74	121	.49	164	.67	2,491	106.36	7	.31	34	1.45
Kidneys, diseases of	377	1.54	43	.18	57	.23	52	2.22	5	.21	7	.30
Varicocele	215	.88	37	.15	.....	.....	19	.81	2	.09	.....	.....
Genito-urinary, others	1,643	6.69	76	.31	2	.01	235	10.03	8	.34	.....	.....
Total diseases of the genito-urinary system	2,235	9.11	156	.64	59	.24	306	13.06	15	.64	7	.30
Adenitis	876	3.57	8	.03	.....	.....	110	4.70	.....	.....	.....	.....
Lymphatic system, others	144	.59	5	.02	2	.01	14	.60	.....	.....	.....	.....
Total diseases of the lymphatic system	1,020	4.16	13	.05	2	.01	124	5.29	.....	.....	.....	.....
Rheumatism, muscular	11,002	44.84	141	.57	.....	.....	1,626	69.43	15	.64	.....	.....
Ostcitis and periostitis	171	.70	19	.08	.....	.....	22	.94	5	.21	.....	.....
Arthritis and synovitis	717	2.92	113	.46	.....	.....	97	4.14	12	.51	.....	.....
Rheumatism, chronic articular	3,384	13.79	172	.70	2	.01	589	25.15	20	.85	.....	.....
Muscles, bones, and joints, others	724	2.95	80	.33	1	.004	77	3.29	8	.34	1	.04
Total diseases of the muscles, bones, and joints	15,998	65.18	525	2.14	3	.01	2,411	102.95	60	2.52	1	.04

TABLE VIII.—*Armies, regular and volunteer, 1898 and 1899—Admissions to sick report, discharges, and deaths from various causes, with their ratio per thousand of mean strength, as compared with the corresponding ratios of the Regular Army for the decade 1888–1897*—Continued.

Causes of admission to sick report.	Decade 1888–1897.											
	White troops.						Colored troops.					
Mean strength	24,548						2,342					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Total diseases of the integumentary system	18,519	75.44	42	0.18	3	0.01	1,068	45.60	4	0.17	1	0.04
Total diseases of the eye	3,770	15.36	207	.84	.....	.....	584	24.94	20	.85	.....	.....
Total diseases of the ear	1,690	6.88	123	.50	2	.01	77	3.29	5	.21	.....	.....
Total diseases of the nose	435	1.77	29	.12	1	.004	25	1.07	2	.09	.....	.....
Total unclassified	896	3.65	14	.06	3	.01	141	6.02	.....	.....	2	.09
Total for diseases	219,199	892.94	3,294	13.42	1,066	4.34	20,713	884.42	312	13.32	131	5.59
Drowning	.....	.....	.....	.....	134	.55	.....	.....	.....	.....	8	.34
Exhaustion from exposure and fatigue	286	1.17	.....	.....	4	.02	16	.68	.....	.....	.....	.....
Heat stroke	503	2.05	6	.02	6	.02	20	.85	1	.04	.....	.....
Lightning	2	.01	.....	.....	1	.004	1	.04	.....	.....	.....	.....
Venomous bites, stings, and wounds	460	1.87	2	.01	.....	.....	47	2.01	.....	.....	.....	.....
Abrasions, blisters, burns, and scalds	4,726	19.25	4	.02	.....	.....	292	11.61	.....	.....	.....	.....
Compression and concussion of brain	147	.60	7	.03	15	.06	15	.64	.....	.....	2	.09
Contusions and sprains	30,164	122.88	58	.24	3	.01	3,108	132.71	4	.17	1	.04
Dislocations	633	2.58	23	.09	1	.004	43	1.84	3	.13	.....	.....
Fractures (not shot)	1,623	6.61	121	.49	32	.13	129	5.51	6	.26	3	.13
Hernia	588	2.40	220	.90	1	.004	64	2.73	21	.90	.....	.....
Wounds, contused, lacerated, and punctured	7,425	30.25	33	.13	5	.02	976	41.68	4	.17	.....	.....
Wounds, incised	3,936	16.04	21	.09	5	.02	440	18.79	1	.04	2	.09
Wounds, gunshot	661	2.69	142	.58	214	.87	121	5.17	14	.60	37	1.58
Secondary results of injury	543	2.21	68	.28	.....	.....	74	3.16	9	.38	.....	.....
Other injuries	6,139	25.01	56	.23	101	.41	888	37.92	9	.38	3	.13
Total for injuries	57,836	235.61	761	3.10	522	2.13	6,214	265.35	72	3.07	56	2.39
Total for diseases and injuries	277,035	1,128.55	4,055	16.52	1,588	6.47	26,927	1,149.76	384	16.40	187	7.98

TABLE VIII.—*Armies, regular and volunteer, 1898 and 1899—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, as compared with the corresponding ratios of the Regular Army for the decade 1888–1897*—Continued.

Causes of admission to sick report.	Decade 1888–1897.											
	Indian troops.						Total army.					
Mean strength	227.						27,117.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever							49	0.18				
Measles	8	3.52					1,525	5.62			1	0.004
Smallpox							25	.09			3	.01
Vaccinia	226	99.56					8,692	32.06	1	0.004		
Influenza	79	34.81					16,073	59.27			47	.17
Dengue							970	3.58				
Mumps	42	18.50					1,389	5.12				
Diphtheria							145	.53			2	.01
Typhoid fever	1	.44					1,343	4.95	3	.01	148	.55
Yellow fever							7	.03			3	.01
Cerebro-spinal fever							13	.05	1	.004	5	.02
Malarial fever, intermittent	66	29.08					17,017	62.76				
Malarial fever, remittent	4	1.76					3,848	14.19			19	.07
Malarial fever, pernicious							18	.07			8	.03
Malarial cachexia							726	2.68	17	.06	1	.004
Fever, undetermined	13	5.73					3,263	12.03				
Erysipelas	13	5.73					480	1.77			17	.06
Septicæmia and tetanus							11	.04			11	.04
Rheumatic fever	9	3.96	1	0.44			1,296	4.78	13	.05	2	.01
Consumption	54	23.79	26	11.41	16	7.04	738	2.72	408	1.50	140	.52
Cancer							54	.20	8	.03	29	.11
Syphilis and results	33	14.54	6	2.64			3,845	14.18	387	1.43	7	.03
Gonorrhœa and results	149	65.64					12,145	44.79	61	.22		
Chancroid and results	26	11.45					3,154	11.63	2	.01		
Infections, others	21	9.25	2	.88			624	2.30	23	.08	13	.05
Total infectious diseases	744	327.75	35	15.37	16	7.04	77,450	285.62	924	3.41	456	1.68
Anæmia							209	.77	15	.06	1	.004
Nutrition, others	1	.44					327	1.21	112	.41	11	.04
Total diseases of nutrition	1	.44					536	1.98	127	.47	12	.04

TABLE VIII.—*Armies, regular and volunteer, 1898 and 1899—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, as compared with the corresponding ratios of the Regular Army for the decade 1888–1897*—Continued.

Causes of admission to sick report.	Decade 1888–1897.											
	Indian troops.						Total army.					
Mean strength	227.						27,117.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Alcoholism	10	4.41					8,692	32.06	12	0.04	58	0.21
Brain and spinal cord	3	1.32	1	0.44	1	0.44	1,324	4.88	203	.75	71	.26
Insanity							317	1.17	281	1.04	9	.03
Meningitis							5	.02			2	.01
Poisoning, narcotic	1	.44					147	.54	15	.06	12	.04
Nervous system, others	71	31.28	2	.88			9,571	35.30	163	.60	4	.01
Total diseases of the nervous system	85	37.45	3	1.32	1	.44	20,056	73.96	674	2.49	156	.58
Poisoning, irritant							246	.91			52	.19
Tonsillitis, pharyngitis, and sore throat	121	53.30					17,691	65.24	2	.01	1	.004
Peritonitis							61	.22	5	.02	20	.07
Dyspepsia, colic, and constipation	132	58.15					14,159	52.21	37	.14	1	.004
Gastritis	3	1.32					858	3.16	24	.09	14	.05
Diarrheal diseases	97	42.74					24,694	91.06	38	.14	17	.06
Enteritis	1	.44					461	1.70	5	.02	16	.06
Perityphlitis and appendicitis							135	.50	3	.01	12	.04
Digestive system, others	33	14.54					7,938	29.28	60	.22	54	.20
Total diseases of the digestive system	387	170.50					66,243	244.29	174	.64	187	.69
Heart, diseases of	5	2.20	2	.88	1	.44	1,226	4.52	318	1.17	91	.34
Arteries and veins							330	1.22	86	.32	31	.11
Total diseases of the circulatory system	5	2.20	2	.88	1	.44	1,556	5.74	404	1.49	122	.45
Bronchitis	121	53.30					17,069	62.94	51	.19	4	.01
Pneumonia	22	9.69			2	.88	1,007	3.71	14	.05	171	.63
Pleurisy	5	2.20	2	.88			555	2.05	18	.07	7	.03
Respiratory system, others	48	21.15	1	.44			7,559	27.88	48	.18	18	.07
Total diseases of the respiratory organs	196	86.34	3	1.32	2	.88	26,190	96.59	131	.49	200	.74

Kidneys, diseases of							429	1.58	48	.18	64	.24
Varicocele							234	.86	39	.14		
Genito-urinary, others	16	7.05	1	.44			1,894	6.98	85	.31	2	.01
Total diseases of the genito-urinary system	16	7.05	1	.44			2,557	9.43	172	.63	66	.25
Adenitis	21	9.25					1,007	3.71	8	.03		
Lymphatic system, others	3	1.32					161	.59	5	.02	2	.01
Total diseases of the lymphatic system	24	10.57					1,168	4.31	13	.05	2	.01
Rheumatism, muscular	81	35.69					12,709	46.87	156	.58		
Osteitis and periostitis	1	.44	1	.44			194	.72	25	.09		
Arthritis and synovitis	3	1.32					817	3.01	125	.46		
Rheumatism, chronic articular	18	7.93	2	.88			3,991	14.72	194	.72	2	.01
Muscles, bones, and joints, others	5	2.20	1	.44			806	2.97	89	.33	2	.01
Total diseases of the muscles, bones, and joints	108	47.57	4	1.76			18,517	68.29	589	2.17	4	.02
Total diseases of the integumentary system	155	68.29					19,742	72.81	46	.17	4	.01
Total diseases of the eye	132	58.15	1	.44			4,486	16.54	228	.84		
Total diseases of the ear	18	7.93			1	.44	1,785	6.58	128	.47	3	.01
Total diseases of the nose	4	1.76					464	1.71	31	.11	1	.004
Total unclassified	14	6.17			1	.44	1,051	3.88	14	.05	6	.02
Total for diseases	1,889	832.16	49	21.57	22	9.68	241,801	891.70	3,655	13.47	1,219	4.50
Drowning					1	.44					143	.53
Exhaustion from exposure and fatigue							302	1.11			4	.01
Heat stroke							523	1.93	7	.03	6	.02
Lightning							3	.01			1	.004
Venomous bites, stings, and wounds	3	1.32					510	1.88	2	.01		
Abrasions, blisters, burns, and scalds	60	26.43					5,058	18.65	4	.01		
Compression and concussion of brain							162	.60	7	.03	17	.06
Contusions and sprains	274	120.71					33,546	123.71	62	.23	4	.01
Dislocations	13	5.73					689	2.54	26	.10	1	.004
Fractures (not shot)	25	11.01			4	1.76	1,777	6.55	127	.47	39	.14
Hernia	3	1.32	3	1.32			655	2.42	244	.90	1	.004
Wounds, contused, lacerated, and punctured	140	61.67					8,541	31.50	37	.14	5	.02
Wounds, incised	54	23.79					4,430	16.34	22	.08	7	.03
Wounds, gunshot	15	6.61	2	.88	11	4.84	797	2.94	158	.58	262	.97
Secondary results of injury	4	1.76	1	.44			621	2.29	78	.29		
Other injuries	52	22.91					7,079	26.11	65	.24	104	.38
Total for injuries	643	283.28	6	2.64	16	7.04	64,693	238.57	839	3.09	594	2.19
Total for diseases and injuries	2,532	1,115.42	55	24.21	38	16.72	306,494	1,130.27	4,494	16.57	1,813	6.69

TABLE VIII.—*Armies, regular and volunteer, 1898 and 1899—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, as compared with the corresponding ratios of the Regular Army for the decade 1888–1897*—Continued.

Causes of admission to sick report.	White troops.											
	1898.						1899.					
Mean strength	140,395.						98,635.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	47	0.33			7	0.05	21	0.21				
Measles	7,258	51.70	7	0.05	70	.50	2,652	26.89	3	0.03	37	0.38
Smallpox	92	.66			23	.16	333	3.38			84	.85
Vaccinia	6,411	45.67	1	.01			6,503	65.91	1	.01	1	.01
Influenza	4,018	28.62	2	.01			5,271	53.44			1	.01
Dengue	191	1.36			2	.01	1,501	15.22				
Mumps	2,018	14.37	2	.01			1,651	16.74				
Diphtheria	57	.41			1	.03	57	.58			5	.05
Typhoid fever	20,719	147.58	44	.31	2,142	15.26	2,147	21.77	24	.24	249	2.52
Yellow fever	937	6.67			108	.77	254	2.58			54	.55
Cerebro-spinal fever	139	.99	9	.06	79	.56	60	.61	3	.03	35	.35
Malarial fever, intermittent	56,374	401.54			9	.06	38,124	386.51	3	.03		
Malarial fever, remittent	24,846	176.94	25	.18	129	.92	16,810	170.42	7	.07	13	.13
Malarial fever, pernicious	464	3.31	5	.04	164	1.17	138	1.40			49	.50
Malarial cachexia	2,911	20.74	31	.22	20	.14	1,705	17.28	102	1.03	18	.18
Fever, undetermined	3,952	28.15			1	.01	2,648	26.85				
Erysipelas	88	.63					83	.84			4	.04
Septicæmia and tetanus	22	.16			16	.11	24	.24	1	.01	7	.07
Rheumatic fever	615	4.38	10	.07			633	6.42	7	.07	3	.03
Consumption	513	3.65	160	1.14	37	.26	391	3.96	181	1.83	17	.18
Cancer	20	.14	2	.01	5	.04	23	.23	4	.04	3	.03
Syphilis and results	1,318	9.39	86	.61	4	.03	1,321	13.39	193	1.96		
Gonorrhœa and results	7,185	51.18	47	.33	1	.01	7,709	78.16	55	.56	1	.01
Chancroid and results	2,514	17.91	7	.05			3,654	37.04	12	.12		
Infections, others	411	2.93	7	.05	6	.04	238	2.41	3	.03	3	.03
Total infectious diseases	143,120	1,019.41	445	3.17	2,827	20.13	93,951	952.48	599	6.06	617	6.25
Anæmia	492	3.50	6	.04	4	.03	478	4.85	15	.15	1	.01
Nutrition, others	536	3.82	24	.17	2	.01	121	1.23	19	.19	3	.03
Total diseases of nutrition	1,028	7.32	30	.21	6	.04	599	6.08	34	.34	4	.04

Alcoholism	1,257	8.95	24	.17	24	.17	1,490	15.11	7	.07	28	.28
Brain and spinal cord	979	6.97	88	.63	41	.29	557	5.65	95	.96	17	.17
Insanity	150	1.07	95	.68	3	.02	178	1.80	86	.87	.....	.....
Meningitis	66	.47	1	.01	31	.22	39	.40	6	.06	16	.16
Poisoning, narcotic	61	.43	7	.05	9	.06	44	.45	6	.06	12	.12
Nervous system, others	3,526	25.12	48	.34	7	.05	2,407	24.40	73	.74	2	.02
Total diseases of the nervous system	6,039	43.01	263	1.88	115	.81	4,715	47.81	273	2.76	75	.75
Poisoning, irritant	263	1.87	1	.01	11	.08	208	2.11	.....	.....	6	.06
Tonsillitis, pharyngitis, and sore throat	5,061	36.05	2	.01	1	.01	4,351	44.11	.....	.....	2	.02
Peritonitis	108	.77	.....	.....	27	.19	43	.44	.....	.....	14	.14
Dyspepsia, colic, and constipation	12,783	91.04	27	.19	4	.03	7,174	72.74	10	.10	.....	.....
Gastritis	2,808	20.00	9	.06	5	.04	2,813	28.52	10	.10	6	.06
Diarrheal diseases	56,192	400.24	65	.46	202	1.44	39,040	395.79	94	.95	222	2.25
Enteritis	3,008	21.43	5	.04	26	.19	972	9.85	6	.06	16	.16
Perityphlitis and appendicitis	345	2.46	12	.09	31	.22	248	2.51	9	.09	16	.16
Digestive system, others	6,063	43.19	52	.37	27	.19	3,352	33.98	46	.47	25	.25
Total diseases of the digestive system	86,631	617.05	173	1.23	334	2.39	58,201	590.05	175	1.77	307	3.10
Heart, diseases of	565	4.02	108	.77	32	.23	519	5.26	140	1.42	28	.28
Arteries and veins	235	1.67	29	.21	2	.01	240	2.43	31	.31	5	.05
Total diseases of the circulatory system	800	5.69	137	.98	34	.24	759	7.69	171	1.73	33	.33
Bronchitis	11,880	84.62	39	.28	2	.01	7,651	77.57	11	.11	.....	.....
Pneumonia	961	6.85	12	.09	123	.88	563	5.71	9	.09	91	.92
Pleurisy	531	3.78	7	.05	6	.04	370	3.75	9	.09	2	.02
Respiratory system, others	5,912	42.11	24	.17	6	.04	3,589	36.39	24	.24	9	.09
Total diseases of the respiratory organs	19,284	137.36	82	.59	137	.97	12,173	123.42	53	.53	102	1.03
Kidneys, diseases of	321	2.29	24	.17	21	.15	225	2.28	15	.15	27	.27
Varicocele	378	2.69	26	.19	.....	.....	414	1.20	16	.16	.....	.....
Genito-urinary, others	1,155	8.23	20	.14	3	.02	1,253	12.70	24	.24	.....	.....
Total diseases of the genito-urinary system	1,854	13.21	70	.50	24	.17	1,892	19.18	55	.55	27	.27
Adenitis	441	3.14	1	.03	.....	.....	636	6.45	2	.02	.....	.....
Lymphatic system, others	116	.83	3	.02	.....	.....	90	.91	4	.04	.....	.....
Total diseases of the lymphatic system	557	3.97	7	.05	.....	.....	726	7.36	6	.06	.....	.....
Rheumatism, muscular	7,536	53.68	72	.51	.....	.....	1,916	19.85	48	.49	.....	.....
Osteitis and periostitis	157	1.12	6	.04	.....	.....	184	1.87	7	.07	.....	.....
Arthritis and synovitis	862	6.14	28	.20	.....	.....	760	7.71	17	.17	.....	.....
Rheumatism, chronic articular	714	5.09	73	.52	1	.01	849	8.61	80	.81	.....	.....
Muscles, bones, and joints, others	328	2.34	35	.25	.....	.....	323	3.27	43	.44	.....	.....
Total diseases of the muscles, bones, and joints	9,597	68.37	214	1.52	1	.01	7,032	71.31	195	1.98	.....	.....

TABE VIII.—*Armies, regular and volunteer, 1898 and 1899—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, as compared with the corresponding ratios of the Regular Army for the decade 1888–1897*—Continued.

Causes of admission to sick report.	White troops.											
	1898.						1899.					
Mean strength	140,395.						98,635.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Total diseases of the integumentary system, all	7,285	51.89	19	0.14	4	0.03	12,449	126.21	17	0.17	1	0.01
Total diseases of the eye	1,330	9.47	46	.33	.....	.....	1,276	12.94	60	.61	.....	.....
Total diseases of the ear	1,038	7.39	44	.31	3	.02	1,281	12.99	85	.86	2	.02
Total diseases of the nose	83	.59	6	.04	.....	.....	129	1.31	2	.02	.....	.....
Total unclassified	3,120	22.22	54	.38	44	.31	758	7.68	1	.01	1	.01
Total for diseases	281,766	2,006.95	1,590	11.33	3,529	25.14	195,941	1,986.51	1,726	17.50	1,169	11.85
Drowning	1	.01	.....	.....	32	.23	.....	.....	.....	.....	77	.78
Exhaustion from exposure and fatigue	1,398	9.96	9	.06	11	.08	1,455	14.75	.....	.....	.....	.....
Heat stroke	532	3.79	12	.09	8	.06	201	2.04	2	.02	.....	.....
Lightning	32	.23	.....	.....	5	.04	7	.07	1	.01	1	.01
Venomous bites, stings, and wounds	438	3.12	1	.01	.....	.....	800	8.11	.....	.....	.....	.....
Abrasions, blisters, burns, and scalds	1,862	13.26	1	.01	.....	.....	1,608	16.30	.....	.....	.....	.....
Compression and concussion of brain	81	.58	2	.01	6	.04	39	.40	.....	.....	5	.05
Contusions and sprains	7,004	49.89	28	.20	1	.01	6,399	64.88	10	.10	.....	.....
Dislocations	259	1.84	9	.06	1	.01	227	2.30	4	.04	.....	.....
Fractures (not shot)	756	5.39	25	.18	16	.11	630	6.39	37	.38	13	.13
Herniæ	1,012	7.21	166	1.18	2	.01	768	7.79	118	1.20	1	.01
Wounds, contused, lacerated, and punctured	1,940	13.82	6	.04	3	.02	2,139	21.69	3	.03	1	.01
Wounds, incised	1,107	7.88	2	.01	9	.06	1,181	11.97	6	.06	21	.21
Wounds, gunshot	1,766	12.58	110	.78	270	1.92	2,201	22.31	211	2.14	523	5.30
Secondary results of injury	164	1.17	21	.15	2	.01	313	3.17	34	.34	1	.01
Other injuries	1,108	7.89	13	.09	42	.30	669	6.78	16	.16	16	.16
Total for injuries	19,460	138.61	405	2.88	408	2.91	18,637	188.95	442	4.48	661	6.70
Total for diseases and injuries	301,226	2,145.56	1,995	14.21	3,937	28.05	214,578	2,175.47	2,168	21.98	1,830	18.55

TABLE VIII.—*Armies, regular and volunteer, 1898 and 1899—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, as compared with the corresponding ratios of the Regular Army for the decade 1888–1897*—Continued.

Causes of admission to sick report.	Colored troops.											
	1898.						1899.					
Mean strength	7,400.						6,911.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever							1	0.14				
Measles	129	17.43					103	14.90				
Smallpox							14	2.03				
Vaccinia	505	68.24					392	56.73				
Influenza	224	30.27					359	51.95			1	0.14
Dengue	58	7.84					101	14.62				
Mumps	57	7.70					188	27.20				
Diphtheria	2	.27					1	.14				
Typhoid fever	207	27.97			50	6.70	37	5.35			9	1.30
Yellow fever	232	31.35			36	4.86	8	1.16			1	.14
Cerebro-spinal fever	1	.14					4	.58			6	.87
Malarial fever, intermittent	4,763	643.65	1	0.14			3,160	457.25	1	0.14		
Malarial fever, remittent	719	97.16			6	.81	392	56.73			3	.43
Malarial fever, pernicious	28	3.78			21	2.84	12	1.74			9	1.30
Malarial cachexia	311	42.03	1	.14			286	41.38	3	.43	2	.29
Fever, undetermined	200	27.03					41	5.93				
Erysipelas	6	.81			1	.14	9	1.30				
Septicæmia and tetanus							1	.14			1	.14
Rheumatic fever	58	7.84	4	.54	1	.14	65	9.41	2	.29		
Consumption	34	4.59	5	.68	1	.14	29	4.20	9	1.30	10	1.45
Cancer	1	.14			1	.14						
Syphilis and results	209	28.24	11	1.49			155	22.43	12	1.74		
Gonorrhœa and results	498	67.29					759	109.82	3	.43		
Chancroid and results	400	54.05	3	.41			440	63.67	1	.14		
Infections, others	12	1.62			1	.14	46	6.66	3	.43	1	.14
Total infectious diseases	8,654	1169.44	25	3.40	118	15.91	6,603	955.46	34	4.90	43	6.20
Anæmia	8	1.08					10	1.45				
Nutrition, others	6	.81			1	.14	5	.72	2	.29	1	.14
Total diseases of nutrition	14	1.89			1	.14	15	2.17	2	.29	1	.14

Alcoholism	22	2.97	1	.14			39	5.64			1	.14
Brain and spinal cord	73	9.86	6	.81	1	.14	108	15.63	5	.72	3	.43
Insanity	9	1.22	3	.41			10	1.45	6	.87		
Meningitis	1	.14			2	.27	3	.43			1	.14
Poisoning, narcotic	4	.54					3	.43			1	.14
Nervous system, others	225	30.40	2	.27	1	.14	306	44.28	4	.58	1	.14
Total diseases of the nervous system	334	45.13	12	1.63	4	.55	469	67.86	15	2.17	7	.99
Poisoning, irritant	2	.27			1	.14	8	1.16				
Tonsillitis, pharyngitis, and sore throat	660	89.19					770	111.42				
Peritonitis							7	1.01				
Dyspepsia, colic, and constipation	626	84.59					904	130.81	1	.14		
Gastritis	51	6.89			1	.14	154	22.28				
Diarrheal diseases	1,244	168.11			12	1.62	1,140	164.96	1	.14	4	.58
Enteritis	124	16.76			1	.14	152	21.99			4	.58
Perityphilitis and appendicitis	17	2.30	1	.14			12	1.74	1	.14		
Digestive system, others	373	50.40	3	.41	3	.41	311	45.00	2	.29		
Total diseases of the digestive system	3,097	418.51	4	.55	18	2.45	3,458	500.37	5	.71	8	1.16
Heart, diseases of	47	6.35	5	.68	2	.27	41	5.93	5	.72	3	.43
Arteries and veins	6	.81					9	1.30	3	.43		
Total diseases of the circulatory system	53	7.16	5	.68	2	.27	50	7.23	8	1.15	3	.43
Bronchitis	749	101.22					724	104.76	1	.14		
Pneumonia	59	7.97			13	1.76	66	9.55			8	1.16
Pleurisy	27	3.65					44	6.37				
Respiratory system, others	178	24.05	1	.14	2	.27	221	31.98	1	.14	1	.14
Total diseases of the respiratory organs	1,013	136.89	1	.14	15	2.03	1,055	152.66	2	.28	9	1.30
Kidneys, disease of	18	2.43	1	.14	2	.27	18	2.60	4	.58	1	.14
Varicocele	8	1.08					9	1.30	1	.14		
Genito-urinary, others	118	15.94	4	.54			168	24.31	3	.43		
Total diseases of the genito-urinary system	144	19.45	5	.68	2	.27	195	28.21	8	1.15	1	.14
Adenitis	32	4.32	1	.14			52	7.52				
Lymphatic system, others	14	1.89					8	1.16				
Total diseases of the lymphatic system	46	6.21	1	.14			60	8.68				
Rheumatism, muscular	753	101.76	3	.41			702	101.59	8	1.16		
Osteitis and periostitis	9	1.22	1	.14			16	2.32	1	.14		
Arthritis and synovitis	61	8.24	1	.14			123	17.80	2	.29		
Rheumatism, chronic articular	113	15.27	8	1.08			100	14.47	15	2.17		
Muscles, bones, and joints, others	11	1.49	1	.14			15	2.17	3	.43		
Total diseases of the muscles, bones, and joints	947	127.98	14	1.91			956	138.35	29	4.19		

TABLE VIII.—*Armies, regular and volunteer, 1898 and 1899—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, as compared with the corresponding ratios of the Regular Army for the decade 1888–1897*—Continued.

Causes of admission to sick report.	Colored troops.											
	1898.						1899.					
Mean strength	7,400.						6,911.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Total diseases of the integumentary system, all	231	31.21	1	0.14	1	0.14	535	77.13	2	0.29	.....	.....
Total diseases of the eye	81	10.95	1	.14	.....	.....	151	21.85	9	1.30	.....	.....
Total diseases of the ear	26	3.51	3	.41	.....	.....	47	6.80	7	1.01	.....	.....
Total diseases of the nose	5	.68	.....	.....	.....	.....	14	2.03	1	.14	.....	.....
Total unclassified	37	5.00	.....	.....	.....	.....	23	3.33	.....	.....	.....	.....
Total for diseases	14,682	1,984.05	72	9.73	161	21.76	13,629	1,972.48	122	17.65	72	10.42
Drowning	.....	.....	.....	.....	3	.41	.....	.....	.....	.....	22	3.18
Exhaustion from exposure and fatigue	12	1.62	.....	.....	.....	.....	21	3.04	.....	.....	1	.14
Heat stroke	12	1.62	.....	.....	1	.14	3	.43	.....	.....	.....	.....
Lightning	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.14
Venomous bites, stings, and wounds	11	1.49	.....	.....	.....	.....	34	4.92	.....	.....	.....	.....
Abrasions, blisters, burns, and scalds	58	7.84	.....	.....	.....	.....	99	14.33	.....	.....	.....	.....
Compression and concussion of brain	6	.81	.....	.....	.....	.....	1	.14	1	.14	.....	.....
Contusions and sprains	408	55.13	5	.68	.....	.....	759	109.82	1	.14	.....	.....
Dislocations	12	1.62	1	.14	.....	.....	16	2.32	.....	.....	.....	.....
Fractures (not shot)	34	4.59	3	.41	1	.14	41	5.93	1	.14	1	.14
Hernia	38	5.13	5	.68	.....	.....	37	5.35	7	1.01	.....	.....
Wounds, contused, lacerated, and punctured	154	20.81	1	.14	.....	.....	255	36.90	.....	.....	1	.14
Wounds, incised	84	11.35	.....	.....	1	.14	134	19.39	.....	.....	.....	.....
Wounds, gunshot	191	25.81	4	.54	32	4.32	75	10.85	15	2.17	15	2.17
Secondary results of injury	19	2.57	.....	.....	.....	.....	53	7.67	3	.43	.....	.....
Other injuries	148	20.00	2	.27	.....	.....	150	21.71	2	.29	2	.29
Total for injuries	1,287	173.92	21	2.84	38	5.13	1,678	242.80	30	4.34	43	6.22
Total for diseases and injuries	15,969	2,157.97	93	12.57	199	26.89	15,307	2,214.88	152	21.99	115	16.64

TABLE VIII.—*Armies, regular and volunteer, 1898 and 1899—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, as compared with the corresponding ratios of the Regular Army for the decade 1888–1897*—Continued.

Causes of admission to sick report.	Total Army.											
	1898.						1899.					
Mean strength	147,795.						105,546.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	47	0.32			7	0.05	22	0.21				
Measles	7,387	49.98	7	0.05	70	.47	2,755	26.10	3	0.03	37	0.35
Smallpox	92	.62			23	.16	347	3.29			84	.80
Vaccinia	6,916	46.80	1	.01			6,895	65.33	1	.01	1	.01
Influenza	4,242	28.70	2	.01			5,630	53.34			5	.05
Dengue	249	1.68			2	.01	1,602	15.18				
Mumps	2,075	14.04	2	.01			1,839	17.42				
Diphtheria	59	.40			4	.03	58	.55			5	.05
Typhoid fever	20,926	141.59	44	.30	2,192	14.83	2,184	20.69	24	.23	258	2.44
Yellow fever	1,169	7.91			144	.97	262	2.48			55	.52
Cerebro spinal fever	140	.95	9	.06	79	.53	64	.61	3	.03	41	.39
Malarial fever, intermittent	61,137	413.67	1	.01	9	.06	41,284	391.15	4	.04		
Malarial fever, remittent	25,565	172.98	25	.17	135	.91	17,202	162.98	7	.07	16	.15
Malarial fever, pernicious	492	3.33	5	.03	185	1.25	150	1.42			58	.55
Malarial cachexia	3,222	21.80	32	.22	20	.14	1,991	18.86	105	.99	20	.19
Fever, undetermined	4,152	28.09			1	.01	2,689	25.48				
Erysipelas	94	.64			1	.01	92	.87			4	.04
Septicæmia and tetanus	22	.15			16	.11	25	.24	1	.01	8	.08
Rheumatic fever	673	4.55	14	.09	1	.01	698	6.61	9	.09	3	.03
Consumption	547	3.70	165	1.12	38	.26	420	3.98	190	1.80	57	.54
Cancer	21	.14	2	.01	6	.04	23	.22	4	.04	3	.03
Syphilis and results	1,527	10.33	97	.66	4	.03	1,476	13.98	205	1.94		
Gonorrhœa and results	7,683	51.99	47	.32	1	.01	8,468	80.23	58	.55	1	.01
Chancroid and results	2,914	19.72	10	.07			4,094	38.79	13	.12		
Infections, others	423	2.86	7	.05	7	.05	284	2.69	6	.06	4	.04
Total infectious diseases	151,774	1,026.94	470	3.19	2,945	19.94	100,554	952.70	633	6.01	660	6.27
Anæmia	500	3.38	6	.04	4	.03	488	4.62	15	.14	1	.01
Nutrition, others	542	3.67	24	.16	3	.02	126	1.19	21	.20	4	.04
Total diseases of nutrition	1,042	7.05	30	.20	7	.05	614	5.81	36	.34	5	.05

Alcoholism	1,279	8.65	25	.17	24	.16	1,529	14.49	7	.07	29	.27
Brain and spinal cord	1,052	7.12	94	.64	42	.28	665	6.30	100	.95	20	.19
Insanity	159	1.08	98	.66	3	.02	188	1.78	92	.87	.....	.....
Meningitis	67	.45	1	.01	33	.22	42	.40	6	.06	17	.16
Poisoning, narcotic	65	.44	7	.05	9	.06	47	.45	6	.06	13	.12
Nervous system, others	3,751	25.38	50	.34	8	.05	2,713	25.70	77	.73	3	.03
Total diseases of the nervous system	6,373	43.12	275	1.86	119	.79	5,184	49.12	288	2.74	82	.77
Poisoning, irritant	265	1.79	1	.01	12	.08	216	2.05	.....	.....	6	.06
Tonsillitis, pharyngitis, and sore throat	5,721	38.71	2	.01	1	.01	5,121	48.52	.....	.....	2	.02
Peritonitis	108	.73	.....	.....	27	.18	50	.47	.....	.....	14	.13
Dyspepsia, colic, and constipation	13,409	90.73	27	.18	4	.03	8,078	76.54	11	.10	.....	.....
Gastritis	2,859	19.35	9	.06	6	.04	2,967	28.11	10	.09	6	.06
Diarrheal diseases	57,436	388.62	65	.44	214	1.45	40,180	380.69	95	.90	226	2.14
Enteritis	3,132	21.19	5	.03	27	.18	1,124	10.65	6	.06	20	.19
Perityphlitis and appendicitis	362	2.45	13	.09	31	.21	260	2.46	10	.09	16	.15
Digestive system, others	6,436	43.55	55	.37	30	.20	3,663	34.71	48	.45	25	.24
Total diseases of the digestive system	89,728	607.12	177	1.19	352	2.38	61,659	584.20	180	1.69	315	2.99
Heart, disease of	612	4.14	113	.76	34	.23	560	5.31	145	1.37	31	.29
Arteries and veins	241	1.63	29	.20	2	.01	249	2.36	34	.32	5	.05
Total diseases of the circulatory system	853	5.77	142	.96	36	.24	809	7.67	179	1.69	36	.34
Bronchitis	12,629	85.46	39	.26	2	.01	8,375	79.35	12	.11	.....	.....
Pneumonia	1,020	6.90	12	.08	136	.92	629	5.96	9	.09	99	.94
Pleurisy	558	3.78	7	.05	6	.04	414	3.92	9	.09	2	.02
Respiratory system, others	6,090	41.21	25	.17	8	.05	3,810	36.10	25	.24	10	.09
Total diseases of the respiratory organs	20,297	137.35	83	.56	152	1.02	13,228	125.33	55	.53	111	1.05
Kidneys, diseases of	339	2.29	25	.17	23	.16	243	2.30	19	.18	28	.27
Varicocele	386	2.61	26	.18	.....	.....	423	4.01	17	.16	.....	.....
Genito-urinary, others	1,273	8.61	24	.16	3	.02	1,421	13.46	27	.26	.....	.....
Total diseases of the genito-urinary system	1,998	13.51	75	.51	26	.18	2,087	19.77	63	.60	28	.27
Adenitis	473	3.20	5	.03	.....	.....	688	6.52	2	.02	.....	.....
Lymphatic system, others	130	.88	3	.02	.....	.....	98	.93	4	.04	.....	.....
Total diseases of the lymphatic system	603	4.08	8	.05	.....	.....	786	7.45	6	.06	.....	.....
Rheumatism, muscular	8,289	56.09	75	.51	.....	.....	5,618	53.23	56	.53	.....	.....
Osteitis and periostitis	166	1.12	7	.05	.....	.....	200	1.89	8	.08	.....	.....
Arthritis and synovitis	923	6.25	29	.20	.....	.....	883	8.37	19	.18	.....	.....
Rheumatism, chronic articular	827	5.60	81	.55	1	.01	949	8.99	95	.90	.....	.....
Muscles, bones, and joints, others	339	2.29	36	.24	.....	.....	338	3.20	46	.44	.....	.....
Total diseases of the muscles, bones, and joints	10,544	71.35	228	1.55	1	.01	7,988	75.68	224	2.13	.....	.....

TABLE VIII.—*Armies, regular and volunteer, 1898 and 1899—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, as compared with the corresponding ratios of the Regular Army for the decade 1888–1897*—Continued.

Causes of admission to sick report.	Total Army.											
	1898.						1899.					
Mean strength	147,795.						105,546.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Total diseases of the integumentory system, all	7,516	50.86	20	0.14	5	0.03	12,982	123.00	19	0.18	1	0.01
Total diseases of the eye	1,411	9.55	47	.32	.....	.....	1,427	13.52	69	.65	.....	.....
Total diseases of the ear	1,064	7.20	47	.32	3	.02	1,328	12.58	92	.87	2	.02
Total diseases of the nose	88	.60	6	.04	.....	.....	143	1.35	3	.03	.....	.....
Total unclassified	3,157	21.36	54	.37	44	.30	781	7.40	1	.01	1	.01
Total for diseases	296,448	2,005.80	1,662	11.25	36.90	24.97	209,570	1,985.58	1,848	17.51	12.41	11.76
Drowning	1	.01	.....	.....	35	.24	.....	.....	.....	.....	99	.94
Exhaustion from exposure and fatigue	1,410	9.54	9	.06	11	.07	1,476	13.98	.....	.....	3	.03
Heat stroke	544	3.68	12	.08	9	.06	204	1.93	2	.02	.....	.....
Lightning	32	.22	.....	.....	5	.03	7	.07	1	.01	2	.02
Venomous bites, stings, and wounds	449	3.04	1	.01	.....	.....	834	7.90	.....	.....	.....	.....
Abrasions, blisters, burns, and scalds	1,920	12.99	1	.01	.....	.....	1,707	16.17	.....	.....	.....	.....
Compression and concussion of brain	87	.59	2	.01	6	.04	40	.38	1	.01	5	.05
Contusions and sprains	7,412	50.15	33	.22	1	.01	7,158	67.82	11	.10	.....	.....
Dislocations	271	1.83	10	.07	1	.01	243	2.30	1	.04	.....	.....
Fractures (not shot)	790	5.35	28	.19	17	.12	671	6.36	38	.36	14	.13
Hernia	1,050	7.10	171	1.16	2	.01	805	7.63	125	1.18	1	.01
Wounds, contused, lacerated, and punctured	2,094	14.17	7	.05	3	.02	2,394	22.68	3	.03	2	.02
Wounds, incised	1,191	8.06	2	.01	10	.07	1,315	12.46	6	.06	21	.20
Wounds, gunshot	2,057	13.92	114	.77	302	2.04	2,276	21.56	226	2.14	538	5.10
Secondary results of injury	183	1.24	21	.14	2	.01	366	3.47	37	.35	1	.01
Other injuries	1,256	8.50	15	.10	42	.28	819	7.76	18	.17	18	.17
Total for injuries	20,747	140.38	426	2.88	446	3.02	20,315	192.48	472	4.47	704	6.67
Total for diseases and injuries	317,195	2,146.18	2,088	14.13	4,136	27.99	229,885	2,178.06	2,320	21.98	1,945	18.43

TABLE IX.—*Number of white and colored applicants for enlistment examined physically during the year 1899, with the number accepted, rejected on primary examination, and declined, with ratios per thousand.*

	White.		Colored.		Total.	
	Number.	Ratio per 1,000 examined.	Number.	Ratio per 1,000 examined.	Number.	Ratio per 1,000 examined.
Examined	64,303	1,000.00	6,008	1,000.00	70,311	1,000.00
Accepted	43,556	677.36	4,343	722.87	47,899	681.24
Rejected	17,596	273.64	1,503	250.17	19,099	271.64
Declined	3,151	49.00	162	26.96	3,313	47.12

In addition to the foregoing, 35 Indians were examined, of whom 19 were enlisted as scouts and 10 for regular service; 6 rejected.

TABLE X.—*Nativity of white and colored recruits accepted during the year 1899, with ratios per thousand accepted.*

Nativity.	White.		Colored.		Total.	
	Number.	Ratio per 1,000 accepted.	Number.	Ratio per 1,000 accepted.	Number.	Ratio per 1,000 accepted.
United States	36,671	765.59	4,312	90.02	40,983	855.61
England	821	17.14			821	17.14
Scotland	199	4.16			199	4.16
Wales	46	.96			46	.96
Ireland	1,637	34.18			1,637	34.18
Canada	546	11.40	7	0.15	553	11.55
Other British	104	2.17	13	.27	117	2.44
France	44	.92			44	.92
Belgium	17	.35			17	.35
Holland	39	.81			39	.81
Denmark	192	4.01			192	4.01
Norway	129	2.69			129	2.69
Sweden	315	6.58			315	6.58
Germany	1,993	41.61			1,993	41.61
Switzerland	140	2.92			140	2.92
Austria	207	4.32			207	4.32
Bohemia	41	.86	1	.02	42	.88
Hungary	32	.67			32	.67
Poland	26	.54			26	.54
Russia	224	4.68			224	4.68
Finland	15	.31			15	.30
Italy	56	1.17			56	1.17
Others	62	1.29	10	.21	72	1.50
Total foreign	6,885	143.74	31	.65	6,916	144.39
Grand total	43,556	909.33	4,343	90.67	47,899	1,000.00

TABLE XI.—*Causes of rejection among 70,311 candidates for enlistment examined during the year 1899, with ratios per thousand examined.*

Number examined	White..... 64,303		Colored 6,008		Total..... 70,311	
Causes of rejection.	Number rejected.	Ratio per 1,000.	Number rejected.	Ratio per 1,000.	Number rejected.	Ratio per 1,000.
Venereal diseases	973	15.13	222	36.95	1,195	17.00
Other infectious diseases	133	2.07	15	2.50	148	2.11
Diseases of nutrition, general	46	.72	2	.33	48	.68
Diseases of the nervous system	34	.53	1	.17	35	.50
Diseases of the digestive system	1,766	27.46	99	16.48	1,865	26.53
Diseases of the circulatory system	2,471	38.42	205	34.12	2,676	38.06
Diseases of the respiratory organs	102	1.59	7	1.17	109	1.55
Diseases of the genito-urinary system	1,487	23.12	90	14.98	1,577	22.43
Diseases of the lymphatic system and ductless glands	47	.73	7	1.17	54	.77
Diseases of the muscles, bones, and joints	162	2.52	19	3.16	181	2.57
Diseases of the integument and subcutaneous connective tissue	256	3.98	21	3.50	277	3.94
Diseases of the eye	2,742	42.64	171	28.46	2,913	41.43
Diseases of the ear	186	2.89	6	1.00	192	2.73
Diseases of the nose	62	.96	6	1.00	68	.97
Hernia	639	9.94	37	6.16	676	9.61
Other injuries	141	2.19	8	1.33	149	2.12
Overheight	3	.05	.....	.....	3	.04
Underheight	409	6.36	18	3.00	427	6.07
Overweight and obesity	42	.65	6	1.00	48	.68
Underweight	1,479	23.00	162	26.96	1,641	23.34
Imperfect physique	2,815	43.78	309	51.43	3,124	44.43
Mental insufficiency	30	.47	4	.67	34	.48
Over age	13	.20	2	.33	15	.21
Minor	257	4.00	6	1.00	263	3.74
Married or having dependent relatives	100	1.56	7	1.17	107	1.52
Illiteracy	42	.65	7	1.17	49	.70
Imperfect knowledge of English	10	.16	.....	.....	10	.14
Reenlistment disapproved for various reasons	11	.17	1	.17	12	.17
Character, bad or doubtful	213	3.31	6	1.00	219	3.12
Reference, none or unsatisfactory	34	.53	3	.50	37	.53
Aliens	8	.12	.....	.....	8	.11
General unfitness and undesirable	655	10.19	36	5.99	690	9.81
No vacancies	3	.05	3	.50	6	.09
Unclassified	225	3.50	17	2.83	242	3.44
Total	17,596	273.64	1,503	250.17	19,099	271.64

INTERNATIONAL TABLE I.—*Examination of recruits during the year 1899.*

No.		White.	Colored.	Total.
1	Total number recruits examined	64,303	6,008	70,311
	Of each 1,000 of these—			
2	Were accepted for service	677.36	722.87	681.24
3	Were rejected for underheight	6.36	3.00	6.07
4	Were rejected for disabilities	267.28	247.17	265.57
	Of each 1,000 accepted recruits the heights were as follows (in inches):			
5	Under 61	.34	.23	.33
6	61 to 62	.48	.69	.50
7	62 to 63	.99	1.84	1.07
8	63 to 64	9.62	10.36	9.69
9	64 to 65	107.54	110.52	107.66
10	65 to 66	137.39	147.82	138.33
11	66 to 67	175.54	178.45	175.81
12	67 to 68	178.97	181.44	179.19
13	68 to 69	154.70	150.36	154.30
14	69 to 70	109.67	102.69	109.04
15	70 to 71	67.34	61.94	66.85
16	71 to 72	34.30	33.39	34.22
17	72 to 73	14.95	12.44	14.72
18	73 to 74	5.90	5.99	5.91
19	74 upward	2.43	1.84	2.38
	Causes of rejection (exclusive of underheight), expressed in ratios per 1,000 of examined recruits:			
20	Physical debility	.72	.33	.68
21	Tuberculosis of lungs or other organs	1.59	1.17	1.55
22	Imperfect vision	42.35	28.30	41.15
23	Heart disease	23.75	29.13	24.21
24	Goiter	.12	.17	.13
25	Varicose veins, varicocele, hemorrhoids	43.96	19.47	41.87
26	Hernia	9.94	6.16	9.61
27	Flat feet	1.82	3.99	2.07

INTERNATIONAL TABLE III.—*Movements of sick, by branches of military service and by months.*

VOLUNTEERS AND REGULARS, 1899.

	Absolute numbers.					Proportions per 1,000.			
			Sick disposed of.			In 1,000 of mean strength there were—		In 1,000 sick disposed of there were—	
	Mean strength.	Sick admissions.	Total.[1]	As fit for duty (recovered).[1]	By death.	Total sick admissions.	Deaths.	Fit for duty (recovered).	Deaths.
ARM OF SERVICE.									
Infantry	71,750	160,629			1,520	2,238.73	21.19		
Cavalry	11,870	33,213			170	2,798.06	14.32		
Artillery	11,238	23,514			129	2,092.37	11.48		
Ordnance	740	760			9	1,027.03	12.16		
Engineers	1,363	2,805			12	2,057.97	8.80		
Signal Corps	719	884			9	1,229.48	12.52		
Medical Department	4,300	4,911			53	1,142.10	12.33		
All others	3,566	3,169			43	888.67	12.06		
MONTH.									
January	158,596	30,175			164	190.27			1.03
February	137,339	25,094			247	168.15			80
March	125,266	22,867			241	185.51			96
April	104,028	16,473			182	158.35			1.75
May	85,934	16,254			132	189.14			84
June	80,227	15,872			136	197.84			70
July	88,504	16,719			140	188.90			58
August	91,920	18,161			137	197.58			.49
September	99,079	16,305			118	164.56			.96
October	101,711	18,033			141	183.19			1.39
November	97,794	17,958			143	183.64			1.46
December	98,156	17,374			164	177.01			1.67

VOLUNTEERS, 1898.

ARM OF SERVICE.									
Infantry	93,744	199,010			2,675	2,122.91	28.54		
Cavalry	2,750	8,218			109	2,988.36	39.64		
Artillery	2,573	5,048			28	1,961.91	10.88		
Ordnance									
Engineers	1,504	3,850			28	2,559.84	18.62		
Signal Corps	589	946			11	1,606.11	18.68		
Medical Department									
All others									
MONTH.									
January									
February									
March									
April									
May	61,775	6,650			39	107.65	.63		
June	150,813	24,813			96	164.53	.64		
July	192,997	37,374			310	193.65	1.61		
August	213,220	52,476			829	246.11	3.89		
September	204,965	39,150			853	191.01	4.16		
October	169,447	22,904			423	135.17	2.50		
November	121,405	17,168			199	141.41	1.64		
December	99,302	16,537			102	166.52	1.03		

[1] Information not tabulated.

INTERNATIONAL TABLE VI.—*Admissions of important diseases, by branches of military service.*

VOLUNTEERS AND REGULARS, 1899.

No.	Diseases of the international nosological table.	Absolute number of admissions.								Admissions per 1,000 of mean strength.							
		Infantry.	Cavalry.	Artillery.	Ordnance.	Engineers.	Signal Corps.	Medical Department.	All others.	Infantry.	Cavalry.	Artillery.	Ordnance.	Engineers.	Signal Corps.	Medical Department.	All others.
1	Alcoholismus acutus, including delirium tremens	931	150	292	10	32	16	58	40	12.98	12.64	25.98	13.51	23.18	22.25	13.49	11.22
2	Bronchitis, all[1]	5,438	1,216	1,132	58	201	6	158	166	75.79	102.41	100.72	78.37	117.47	8.34	36.75	46.55
3	Cholera asiatica																
4	Cholera nostras[2]																
5	Diphtheria et croup	38	1	6				6	1	.53	.84	.53				1.40	1.12
6	Dysenteria[2]																
7	Erysipelas	57	13	12	1	1		5	3	.79	1.10	1.07	1.35	.73		1.16	.84
8	Febris intermittens (malaria)	29,293	7,320	2,967	77	485	110	683	349	408.26	616.68	261.02	101.05	355.86	152.99	158.84	97.87
9	Febris recurrens	13,511	1,831	1,113	8	113	95	488	40	188.34	154.26	99.01	10.81	82.91	132.13	113.19	11.22
10	Gonorrhea	5,080	1,415	1,100	15	79	33	251	195	70.80	119.21	124.58	20.27	57.97	45.90	58.57	54.68
11	Hernia	584	63	96	4	9	1	28	20	8.14	5.31	8.54	5.41	6.60	1.39	6.54	5.61
12	Influenza	4,129	496	553	71	114	1	192	74	57.55	41.79	49.21	95.94	83.64	1.39	11.65	20.75
13	Insolatio (Hitzschlag, coup de chaleur)	166	10	20	1	3	1	3		2.31	.84	1.78	1.35	2.20	1.39	.70	
14	Meningitis cerebro-spinalis epidemica	31	2	5		1		1	2	.43	.17	.44		.73		.23	.56
15	Morbilli	1,995	127	266		21	10	91	242	27.80	10.70	23.67		15.41	13.91	21.86	67.87
16	Parotitis epidemica	1,510	112	92	1	8	3	33	80	21.05	9.44	8.19	1.35	5.87	4.17	7.67	22.44
17	Pneumonia crouposa sive lobaris	447	72	42	1	13	3	19	32	6.23	6.07	3.74	1.35	9.54	4.17	4.42	8.97
18	Rheumatismus articulorum	1,226	155	120	9	20	2	78	37	17.09	13.06	10.68	12.17	14.67	2.78	18.14	10.38
19	Scarlatina	15						5	2	.21						1.16	.56
20	Scorbutus																
21	Syphilis	942	223	233	1	13	4	36	24	13.13	18.79	20.73	1.35	9.54	5.56	8.37	6.73
22	Trachoma[2]																
23	Tuberculosis pulmonum	268	42	61		7	3	26	13	3.74	3.54	5.43		5.14	4.17	6.05	3.65
24	Tuberculosis ceterorum organorum[2]																
25	Typhus abdominalis	1,371	432	208	2	16	28	100	27	19.11	36.40	18.51	2.70	11.74	38.94	23.26	7.57
26	Typhus exanthematicus[2]																
27	Variola	302	8	27		1	1	6	2	4.21	.67	2.40		.73	1.39	1.40	.56
28	Morbi auris	926	170	165	3	9	5	28	22	12.91	14.32	14.68	4.05	6.60	6.95	6.51	6.17
29	Morbi cordis	360	95	65	4	4	1	18	13	5.02	8.00	5.78	5.41	2.93	1.39	4.19	3.65
30	Morbi cutis	8,844	2,021	1,618	23	126	31	196	123	123.26	170.26	143.98	31.08	92.45	43.12	45.58	34.49
31	Morbi mentis	122	22	19	1			14	10	1.70	1.85	1.69	1.35			3.26	2.80
32	Morbi oculi	882	214	190	18	35	8	38	42	12.29	18.03	16.91	24.32	25.68	11.13	8.84	11.78
33	Morbi systemat. urin. et sexual (excl. ven. et syph.)	1,380	329	249	13	22	6	58	30	19.23	27.71	22.15	17.56	16.14	8.34	13.49	8.41

1	Alcoholismus acutus, including delirium tremens	516	3	20	.....	25	8	.....	.....	5.40	1.09	7.77	.....	16.62	13.58	.....
2	Bronchitis, all[1]	7,405	162	215	.....	133	20	.....	.....	78.99	58.91	83.56	.....	88.44	33.96	.....
3	Cholera asiatica	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4	Cholera nostras[2]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
5	Diphtheria et croup	42	.....	.....	.....	.....	.....	.....	.....	.45	.....	.....	.....	.....	.....	.....
6	Dysenteria[2]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
7	Erysipelas	58	.....	2	.....	7	.....	.....	.....	.62	.....	.78	.....	4.65	.....	.....
8	Febris intermittens (malaria)	36,890	1,231	569	.....	462	158	.....	.....	396.50	447.64	221.14	.....	307.18	268.25	.....
9	Febris recurrens	16,404	447	101	.....	330	100	.....	.....	174.98	162.55	39.26	.....	219.42	169.78	.....
10	Gonorrhœa	4,768	209	216	.....	45	19	.....	.....	50.86	76.01	83.95	.....	29.92	32.26	.....
11	Hernia	709	26	22	.....	33	5	.....	.....	7.56	9.45	8.55	.....	21.94	8.49	.....
12	Influenza	2,471	8	173	.....	77	3	.....	.....	26.36	2.91	67.24	.....	51.20	5.09	.....
13	Insolatio (Hitzschlag, coup de chaleur)	273	10	2	.....	4	6	.....	.....	2.91	3.64	.78	.....	2.66	10.19	.....
14	Meningitis cerebro-spinalis epidemica	53	.....	1	.....	.....	.....	.....	.....	.57	.....	.39	.....	.....	.....	.....
15	Morbilli	6,058	106	44	.....	6	3	.....	.....	64.62	38.55	17.10	.....	3.99	5.09	.....
16	Parotitis epidemica	1,811	20	27	.....	5	.....	.....	.....	19.32	7.27	10.49	.....	3.32	.....	.....
17	Pneumonia crouposa sive lobaris	749	16	16	.....	13	.....	.....	.....	7.99	5.82	6.22	.....	8.64	.....	.....
18	Rheumatismus articulorum	845	15	18	.....	17	3	.....	.....	9.01	5.45	6.99	.....	11.30	5.09	.....
19	Scarlatina	33	1	1	.....	.....	.....	.....	.....	.35	.36	.39	.....	.....	.....	.....
20	Scorbutus	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
21	Syphilis	972	32	35	.....	14	4	.....	.....	10.37	11.64	15.60	.....	9.31	6.79	.....
22	Trachoma[2]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
23	Tuberculosis pulmonum	389	17	5	.....	7	.....	.....	.....	4.15	6.18	1.94	.....	4.65	.....	.....
24	Tuberculosis ceterorum organorum[2]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
25	Typhus abdominalis	15,794	538	162	.....	224	78	.....	.....	168.48	195.63	62.96	.....	148.94	132.42	.....
26	Typhus exanthematicus[2]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
27	Variola	68	.....	1	.....	4	.....	.....	.....	.73	.....	.39	.....	.....	6.79	.....
28	Morbi auris	667	16	39	.....	22	.....	.....	.....	7.11	5.82	15.16	.....	14.63	.....	.....
29	Morbi cordis	312	20	10	.....	9	5	.....	.....	3.33	7.27	3.89	.....	5.98	8.49	.....
30	Morbi cutis	4,153	251	204	.....	63	20	.....	.....	44.30	91.28	79.28	.....	11.89	33.96	.....
31	Morbi mentis	94	3	2	.....	4	.....	.....	.....	1.00	1.09	.78	.....	2.66	.....	.....
32	Morbi oculi	852	46	27	.....	25	5	.....	.....	9.09	16.73	10.49	.....	16.62	8.49	.....
33	Morbi systemat. urin. et sexual (excl. ven. et syph.)	1,301	69	44	.....	30	5	.....	.....	13.88	25.49	17.10	.....	19.94	8.49	.....

[1] Acute not tabulated separately.

[2] Not tabulated separately.

INTERNATIONAL TABLE VII.—*Admissions of important diseases, by months (absolute numbers).*

VOLUNTEERS AND REGULARS, 1899.

No.	Diseases of the international nosological table.	Admissions by months.											
		Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	Alcoholismus acutus, including delirium tremens	174	138	149	133	115	101	124	111	115	109	151	109
2	Bronchitis, all[1]	2,097	1,461	1,185	654	495	326	294	308	322	358	434	441
3	Cholera asiatica												
4	Cholera nostras[2]												
5	Diphtheria et croup	6	4	4	1	8	6	8	7	8	4	2	
6	Dysenteria[2]												
7	Erysipelas	7	11	9	15	10	8	5	5	9	2	8	3
8	Febris intermittens (malaria)	5,193	4,480	4,188	2,838	1,927	1,825	2,256	3,101	3,112	3,594	4,203	4,567
9	Febris recurrens	2,279	1,533	1,962	1,145	1,141	949	1,063	1,355	1,157	1,583	1,642	1,393
10	Gonorrhea	1,067	860	848	651	661	574	579	620	572	684	670	662
11	Hernia	113	78	68	61	76	84	60	53	85	50	29	48
12	Influenza	3,059	1,275	732	128	55	45	32	59	68	47	53	77
13	Insolatio (Hitzschlag, coup de chaleur)	4	13	26	40	27	36	11	14	5	10	13	5
14	Meningitis cerebro-spinalis epidemica	18	5	1	7	3			3	1	2		2
15	Morbilli	826	417	335	230	271	132	52	62	96	72	25	237
16	Parotitis epidemica	283	290	320	156	149	91	91	130	85	93	61	90
17	Pneumonia crouposa sive lobaris	145	109	79	59	37	16	35	26	25	41	26	31
18	Rheumatismus articulorum	208	154	173	169	115	122	113	135	124	116	119	99
19	Scarlatina	9	9	2				2					
20	Scorbutus												
21	Syphilis	221	154	146	115	98	87	105	112	95	106	123	114
22	Trachoma[2]												
23	Tuberculosis pulmonum	49	32	38	23	37	31	36	41	34	36	31	32
24	Tuberculosis ceterorum organorum[2]												
25	Typhus abdominalis	215	194	209	243	195	218	175	161	233	125	110	106
26	Typhus exanthematicus[2]												
27	Variola	76	46	60	29	7	10	4	3	20	18	48	26
28	Morbi auris	123	109	101	79	122	125	122	122	109	125	101	90
29	Morbi cordis	63	47	41	40	48	25	41	69	44	54	40	45
30	Morbi cutis	780	699	767	799	951	959	1,153	1,342	1,334	1,269	1,358	1,571
31	Morbi mentis	17	12	13	17	12	18	16	17	14	19	21	12
32	Morbi oculi	173	137	130	109	118	114	75	132	125	95	107	112
33	Morbi systemat. urin. et sexual (excl. ven. et syph.)	275	217	190	144	139	163	170	197	185	165	128	114

VOLUNTEERS, 1898.

(Not organized until May.)

1	Alcoholismus acutus, including delirium tremens					11	24	63	67	101	93	98	115
2	Bronchitis, all[1]					457	761	1,087	974	964	951	1,230	1,511
3	Cholera asiatica												
4	Cholera nostras[2]												
5	Diphtheria et croup					6	13	2	7	4	2	6	2
6	Dysenteria[2]												
7	Erysipelas					1	8	8	14	7	8	14	7
8	Febris intermittens (malaria)					365	2,362	5,623	11,423	8,630	4,859	3,526	2,522
9	Febris recurrens					46	511	2,045	5,084	4,665	2,339	1,498	1,194
10	Gonorrhœa					204	564	883	835	714	724	706	627
11	Hernia					16	84	146	158	132	104	86	69
12	Influenza					155	229	228	121	137	257	212	1,393
13	Insolatio (Hitzschlag, coup de chaleur)					15	34	131	61	44	7	1	2
14	Meningitis cerebro-spinalis epidemica					2	8	7	16	10	4	3	4
15	Morbilli					285	1,343	1,716	1,492	570	319	260	232
16	Parotitis epidemica					42	292	300	342	310	168	183	226
17	Pneumonia crouposa sive lobaris					129	144	135	69	56	73	82	106
18	Rhematismus articulorum					17	91	145	173	154	113	94	111
19	Scarlatina							2	20	4	4	3	2
20	Scorbutus												
21	Syphilis					11	98	142	164	155	162	171	154
22	Trachoma[2]												
23	Tuberculosis pulmonum					9	60	66	76	59	45	48	55
24	Tuberculosis ceterorum organorum[2]												
25	Typhus abdominalis					33	368	2,087	5,545	5,155	2,537	822	249
26	Typhus exanthematicus[2]												
27	Variola						5		4	15	15	18	16
28	Morbi auris					35	104	132	141	115	94	50	73
29	Morbi cordis					18	39	65	60	63	49	29	33
30	Morbi cutis					219	716	974	999	624	382	338	439
31	Morbi mentis					3	23	24	20	11	9	3	10
32	Morbi oculi					102	180	170	138	107	93	78	87
33	Morbi systemat. urin. et sexual (excl. ven. et syph.)					51	153	276	248	246	156	169	150

[1] Acute not tabulated separately.

[2] Not tabulated separately.

Respectfully submitted.

GEO. M. STERNBERG,
Surgeon-General United States Army.

Hon. ELIHU ROOT,
Secretary of War.

O

REPORT

OF THE

SURGEON-GENERAL OF THE ARMY

TO THE

SECRETARY OF WAR

FOR THE

FISCAL YEAR ENDING JUNE 30, 1901.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1901.

Columbia University
in the City of New York
College of Physicians and Surgeons

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REPORT

OF

THE SURGEON-GENERAL.

WAR DEPARTMENT,
SURGEON-GENERAL'S OFFICE,
Washington, D. C., October 1, 1901.

SIR: In submitting a report of the administration of the duties of this office during the past year I have the honor, first, to invite attention to the financial transactions for the year ended June 30, 1901.

FINANCIAL STATEMENT, 1901.[1]

Medical and Hospital Department, 1901.

Appropriated by act approved May 26, 1900	$2,000,000.00	
Transferred from appropriation "Medical and Hospital Department, 1899," by act approved March 3, 1901	150,000.00	
		$2,150,000.00
Sale to Quartermaster's Department	70.00	
Refunded during the year (including transfer settlements by Treasury Department to adjust appropriations, $45,957.94)	46,234.20	
		46,304.20
Total to be accounted for		2,196,304.20
Disbursed during the year:		
Expenses of medical supply depots	563.32	
Medical supplies	1,519,717.50	
Medical attendance and medicines	12,088.26	
Medical expenses of recruiting	37,825.95	
Pay of nurses	83,245.09	
Pay of other employees	141,963.87	
Washing of hospital linen	57,775.28	
Miscellaneous (notary fees, exchange, and expressage)	90.48	
		1,853,269.75
Transferred by Treasury settlement to adjust appropriations		2.67

[1] The disbursements in this statement include settlements with public creditors made by the accounting officers of the Treasury and charged by them to these appropriations.

Balances on hand June 30, 1901:		
In United States Treasury and in transit thereto	$200,340.00	
In hands of disbursing officers—		
Washington	8,514.06	
St. Louis	19,642.45	
San Francisco	34,472.85	
St. Michael, Alaska	3,521.35	
Havana, Cuba	458.89	
Tientsin, China (Pekin relief expedition)	2,817.25	
Nagasaki, Japan (Pekin relief expedition)	4,631.97	
Manila, P. I.	68,093.10	
Aparri, P. I.	294.74	
Iloilo, P. I.	240.56	
Vigan, P. I.	4.56	
		$343,031.78
Total accounted for		2,196,304.20

Medical and hospital department, 1900.

Balances on hand July 1, 1900,[1] acts of March 3, 1899, and February 9, 1900		$445,463.89
Refunded during the year (including transfer settlements by Treasury Department to adjust appropriations, $526.62)		2,646.40
Total to be accounted for		448,110.29
Disbursed during the year:[2]		
Expenses of medical supply depots	$100.94	
Medical supplies	142,908.00	
Medical attendance and medicines	2,898.25	
Medical expenses of recruiting	2,821.65	
Pay of nurses	9,506.76	
Pay of other employees	3,769.19	
Washing of hospital linen	8,232.52	
Miscellaneous (notary fees and exchange)	286.42	
		170,523.73
Transferred by Treasury settlements to adjust appropriations		167,364.28
Balances on hand June 30, 1901:		
In United States Treasury	$105,403.81	
In hands of disbursing officers—		
Washington	4,117.82	
San Francisco	700.65	
		110,222.28
Total accounted for		448,110.29

Medical and hospital department, 1899.

Balances on hand July 1, 1900, acts of March 15, 1898, January 5, 1899, and March 3, 1899		$385,081.70
Refunded during the year (including transfer settlements by Treasury Department to adjust appropriations, $123,015.23)	$123,079.64	
Erroneous deposit on account of board of officer in hospital	24.00	
		123,103.64
Total to be accounted for		508,185.34

[1] Including balance at Cebu, P. I., June 1, 1900, the June account from that station not having been received at date of last annual report.

[2] Including disbursements at Cebu, P. I., during June, 1900, not previously reported. See preceding note.

Disbursed during the year:		
Medical supplies	$1,677.87	
Medical attendance and medicines	3,764.83	
Medical expenses of recruiting	114.60	
Pay of nurses	1,544.51	
Pay of other employees	224.13	
Washing of hospital linen	297.30	
Exchange	519.39	
		$8,142.63
Treasury settlement to cancel erroneous deposit on account of board of officer in hospital		24.00
Transferred to appropriation "Medical and hospital department, 1901," by act approved March 3, 1901		150,000.00
Transferred to surplus fund		350,018.71
Total accounted for		508,185.34

Medical and hospital department, January 1, 1899.

Balances on hand July 1, 1900, acts of May 4, 1898, June 8, 1898, and July 7, 1898		$26,521.24
Refunded during the year		10.29
Total to be accounted for		26,531.53
Disbursed during the year:		
Medical supplies	$952.45	
Medical attendance	341.29	
Medical expenses of recruiting	32.40	
Pay of nurses	3.25	
		1,329.39
Transferred to surplus fund		25,202.14
Total accounted for		26,531.53

Medical and hospital department, certified claims.

Appropriated by act approved March 3, 1901	$8.50
Disbursed during the year	8.50

Appropriation for national defense, act of March 9, 1898.

Allotment by the President April 16, 1898:	
Balance on hand July 1, 1900	$5.51
Amount not drawn from Treasury, no longer available, dropped to close account on books of this office	5.51
Reallotment by the President September 8, 1898:	
Balance on hand July 1, 1900	1,592.59
Amount not drawn from Treasury, no longer available, dropped to close account on books of this office	1,592.59
Allotment by the President October 6, 1898:	
Balance on hand July 1, 1900	24,124.63
Refunded during the year	99.85
Total to be accounted for	24,224.48
Disbursed during the year:	
Medical attendance	$213.15
Medical expenses of recruiting	88.40
	301.55
Amount not drawn from Treasury, no longer available, dropped to close account on books of this office	23,922.93
Total accounted for	24,224.48

Allotment by the President November 22, 1898:		
Balances on hand July 1, 1900		$21,481.68
Disbursed during the year:		
Medical supplies	$12.50	
Medical attendance	528.00	
Medical expenses of recruiting	421.40	
Washing of hospital linen	12.50	
		974.40
Amount not drawn from Treasury, no longer available, dropped to close account on books of this office		20,507.28
Total accounted for		21,481.68

Reimbursement to contract nurses (traveling expenses).

Appropriated by act approved June 6, 1900	$4,000.00
Disbursed during the year	677.44
Balance in United States Treasury June 30, 1901	3,322.56
Total accounted for	4,000.00

Artificial limbs, 1901.

Appropriated by act approved June 6, 1900	$173,000.00
Disbursed during the year	156,814.61
Balance on hand June 30, 1901	16,185.39

Artificial limbs, 1900.

Balance July 1, 1900, act of March 3, 1899	$43,302.05
Disbursed during the year	6,968.05
Balance on hand June 30, 1901	36,334.00

Artificial limbs, 1899.

Balance July 1, 1900, act of July 1, 1898	$0.00
Refunded during the year	50.00
Total to be accounted for	50.00
Disbursed during the year	45.32
Balance on hand June 30, 1901	4.68
Total accounted for	50.00

Artificial limbs, certified claims.

Appropriated by act approved March 3, 1901	$860.21
Disbursed during the year	860.21

Appliances for disabled soldiers, 1901.

Appropriated by act approved June 6, 1900	$2,000.00
Disbursed during the year	1,454.52
Balance on hand June 30, 1901	545.48

Appliances for disabled soldiers, 1900.

Balance July 1, 1900, act of March 3, 1899	$979.50
Disbursed during the year	74.25
Balance on hand June 30, 1901	905.25

Appliances for disabled soldiers, 1899.

Balance July 1, 1900, act of July 1, 1898	$690.11
Transferred to surplus fund	690.11

Army Medical Museum, 1901.

Appropriated by act approved May 26, 1900	$5,000.00
Disbursed during the year	2,889.70
Balance on hand June 30, 1901	2,110.30

Army Medical Museum, 1900.

Balance July 1, 1900, act of March 3, 1899	$2,113.43
Disbursed during the year	1,453.00
Balance on hand June 30, 1901	660.43

Army Medical Museum, 1899.

Balance July 1, 1900, act of March 15, 1898	$14.80
Transferred to surplus fund	14.80

Library, Surgeon-General's Office, 1901.

Appropriated by act approved May 26, 1900	$10,000.00
Disbursed during the year	6,675.87
Balance on hand June 30, 1901	3,324.13

Library, Surgeon-General's Office, 1900.

Balance July 1, 1900, act of March 3, 1899	$1,224.63
Disbursed during the year	1,213.42
Balance on hand June 30, 1901	11.21

Furnishing trusses to disabled soldiers (sections 1176, 1177, and 1178, Revised Statutes, and act of March 3, 1879).

Expended during the year	$7,807.44

ARTIFICIAL LIMBS AND THEIR COMMUTATION.

Under the laws relating to artificial limbs there were furnished during the year ended June 30, 1901, 37 artificial legs, 2 arms, and 2 feet, while commutation certificates were issued and paid in the cases of 151 amputated legs, 113 amputated arms, 9 amputated feet, and 2,748 cases in which the loss of the use of a limb was regarded as proved by the evidence on file. These cases involved the expenditure of $156,814.61 from the appropriations available.

Under existing laws these benefits to disabled soldiers recur every three years, so that the claimants who were furnished with limbs or paid commutation during the past fiscal year are chiefly the survivors of the beneficiaries of the year ended June 30, 1898. The sum of $173,000 was estimated and appropriated for their benefit, of which, as stated above, $156,814.61 has been expended. For the current year 1901–1902 the sum of $125,000 was appropriated, which will probably suffice to meet the requirements of the survivors who were last paid in 1899.

During the year 1902–1903 the cases which were paid in the fiscal year ended June 30, 1900, will again require to be met, together with a series of new claimants resulting from disabilities incurred in the Spanish-American war and the Philippine insurrection. In the year ended June 30, 1900, the sum of $506,595.24 was expended. It is believed that the number of deaths that have occurred among these beneficiaries will be more than offset by claimants for disability from the war forces of the country in service since 1898, together with the increasing disabilities of the survivors of the Civil war. A careful consideration of the conditions indicates that the estimate for the year ending June 30, 1903, should be at least $514,000.

Since the commencement of the war with Spain, in April, 1898, 128 men disabled during and since that war have been furnished with or paid for 25 artificial arms, 43 legs, 1 foot, and commutation in 91 cases for the loss of the use of the limb. Twenty-five men lost 1 arm each; 42 1 leg; 1 lost 1 leg and the use of the other; 1 lost 1 foot. Twenty-three men lost the use of 1 arm; 2 the use of 1 arm and 1 leg; 2 the use of 1 arm and both legs; 3 the use of both arms; 13 the use of 1 leg, and 16 the use of both legs.

The following tabulation summarizes the disabilities which have been approved by this office and paid for from the appropriations made annually by Congress since June 17, 1870, to June 30, 1901. On the latter date there remained on the list of beneficiaries 13,200 cases, mostly veterans of the Civil war, with the exception of those mentioned in the preceding paragraph. Most of those marked dropped on the list were taken up again under additional disabilities.

Artificial limbs, apparatus, and commutation June 17, 1870, to June 30, 1901, inclusive.

Disabilities.	1870–1875.						1875–1880.					
	Allowed.	Died.	Dropped.	Rejected.	Casualties.	Remaining.	Allowed.	Died.	Dropped.	Rejected.	Casualties.	Remaining.
Loss of—												
1 arm	4,724	1,966	172	1	2,139	2,585	152	55	8	....	63	89
1 arm and 1 leg	20	11	1	....	12	8	....	....	....	....	....	....
1 arm and use 1 arm	9	4	....	....	4	5	7	5	....	....	5	2
1 arm and use 1 arm and 2 legs	....	....	....	....	....	....	1	1	....	....	1	....
1 arm and use 1 leg	2	2	....	....	2	....	1	1	....	....	1	....
2 arms	32	16	1	....	17	15	....	....	....	....	....	....
2 arms and 2 legs	1	1	....	....	1	....	....	....	....	....	....	....
1 leg	4,659	1,734	157	3	1,894	2,765	148	60	10	....	70	78
1 leg and 1 foot	8	1	1	....	2	6	1	1	....	....	1	....
1 leg and 1 foot and use 2 arms	1	1	....	....	1	....	....	....	....	....	....	....
1 leg and use 1 arm	7	4	....	....	4	3	5	1	....	....	1	4
1 leg and use 2 arms	2	2	....	....	2	....	....	....	....	....	....	....
1 leg and use 1 leg	8	4	1	....	5	3	8	4	....	....	4	4
2 legs	45	18	3	....	21	24	....	....	....	....	....	....
1 foot	76	25	5	2	32	44	8	1	....	....	1	7
2 feet	15	9	2	....	11	4	2	....	1	....	1	1
Loss of use of—												
1 arm	1,740	734	87	31	852	888	794	311	47	40	398	396
1 arm and 1 leg	11	8	1	1	10	1	20	10	4	1	15	5
1 arm and 2 legs	2	2	....	....	2	....	5	3	1	1	5	....
2 arms	8	5	....	1	6	2	20	11	1	....	12	8
2 arms and 2 legs	1	....	....	....	....	1	14	14	....	....	14	....
1 leg	587	284	65	24	373	214	504	209	47	19	275	229
2 legs	31	13	2	3	18	13	57	35	12	....	47	10
Total	11,989	4,844	498	66	5,408	6,581	1,747	722	131	61	914	833

Artificial limbs, apparatus, and commutation, etc.—Continued.

Disabilities.	1880–1885.						1885–1890.					
	Allowed.	Died.	Dropped.	Rejected.	Casualties.	Remaining.	Allowed.	Died.	Dropped.	Rejected.	Casualties.	Remaining.
Loss of—												
1 arm	103	42	3	....	45	58	53	16	....	....	16	37
1 arm and 1 leg	1	....	....	....	....	1	....	....	....	....	....	....
1 arm and use 1 arm	3	1	1	....	2	1	8	....	....	....	....	8
1 arm and use 1 leg	....	....	....	....	....	....	1	....	1	....	1	....
1 arm and use 2 legs	....	....	....	....	....	....	2	1	....	....	1	1
1 leg	122	33	5	1	39	83	146	45	2	2	49	97
1 leg and 1 foot	....	....	....	....	....	....	1	1	....	....	1	....
1 leg and use 1 arm	....	....	....	....	....	....	4	3	....	....	3	1
1 leg and use 1 arm and 1 leg	1	....	....	....	....	1	....	....	....	....	....	....
1 leg and use 1 leg	1	....	....	....	....	1	7	1	....	....	4	3
2 legs	4	3	....	....	3	1	2	1	....	....	1	1
1 foot	10	2	2	....	4	6	6	2	....	....	2	4
1 foot and use 1 leg	....	....	....	....	....	....	1	1	....	....	1	....
2 feet	5	1	....	....	1	4	1	....	....	....	....	1
Loss of use of—												
1 arm	1,937	521	64	157	742	1,195	1,374	309	25	75	409	965
1 arm and 1 leg	68	21	6	8	35	33	142	47	8	13	68	74
1 arm and 2 legs	21	11	3	2	16	5	24	10	1	2	13	11
2 arms	31	14	5	4	23	8	61	27	8	3	38	23
2 arms and 1 leg	6	3	1	....	4	2	10	9	1	....	10	....
2 arms and 2 legs	57	42	3	1	46	11	60	33	3	3	39	21
1 leg	1,393	447	104	149	700	693	1,302	350	63	91	504	798
2 legs	203	98	20	16	134	69	252	119	15	18	152	100
Total	3,966	1,239	217	338	1,794	2,172	3,457	978	127	207	1,312	2,145

Disabilities.	1890–1893.						1893–1896.					
	Allowed.	Died.	Dropped.	Rejected.	Casualties.	Remaining.	Allowed.	Died.	Dropped.	Rejected.	Casualties.	Remaining.
Loss of—												
1 arm	29	5	....	....	5	24	8	....	....	....	....	8
1 arm and use 1 arm	1	....	....	....	....	1	1	....	....	....	....	1
1 arm and use 1 arm and 2 legs	1	....	....	....	....	1	....	....	....	....	....	....
1 arm and use 1 leg	1	....	....	....	....	1	1	....	....	....	....	1
1 arm and use 2 legs	....	....	....	....	....	....	1	....	....	....	....	1
1 leg	72	15	....	....	15	57	61	5	....	....	5	56
1 leg and use 1 arm	1	....	....	....	....	1	....	....	....	....	....	....
1 leg and use 1 arm and 1 leg	1	1	....	....	1	....	....	....	....	....	....	....
2 legs	1	....	....	....	....	1	2	1	....	....	1	1
1 foot	5	2	....	....	2	3	....	....	....	....	....	....
Loss of use of—												
1 arm	298	61	6	11	78	220	75	13	1	1	15	60
1 arm and 1 leg	85	25	2	2	29	56	22	8	1	....	9	13
1 arm and 2 legs	9	4	....	....	4	5	4	....	....	....	....	4
2 arms	19	7	2	....	9	10	6	1	1	....	2	4
2 arms and 1 leg	5	2	....	1	3	2	1	....	....	....	....	1
2 arms and 2 legs	32	14	1	2	17	15	18	9	....	....	9	9
1 leg	329	72	11	16	99	230	107	9	3	4	16	91
2 legs	99	37	6	7	50	49	49	15	....	4	19	30
Total	988	245	28	39	312	676	356	61	6	9	76	280

Artificial limbs, apparatus, and commutation, etc.—Continued.

Disabilities.	1896–1899.					1899–1902.				Recapitulation.					
	Allowed.	Died.	Dropped.	Casualties.	Remaining.	Allowed.	Died.	Casualties.	Remaining.	Allowed.	Died.	Dropped.	Rejected.	Casualties.	Remaining.
Loss of—															
1 arm	13	...	...	...	13	20	...	...	20	5,102	2,084	183	1	2,268	2,834
1 arm and 1 leg	...	...	...	...	...	...	...	...	...	21	11	1	....	12	9
1 arm and use 1 arm	...	...	...	...	...	...	...	...	...	29	10	[1]	....	11	18
1 arm and use 1 arm and 2 legs	...	...	...	...	...	...	...	...	...	2	1	.....	...	1	1
1 arm and use 1 leg	...	...	...	...	...	...	...	...	...	6	3	1	....	4	2
1 arm and use 2 legs	...	...	...	...	...	...	...	...	...	3	1	.....	...	1	2
2 arms	...	...	...	...	...	...	...	...	...	32	16	1	....	17	15
2 arms and 2 legs	...	...	...	...	...	...	...	...	...	1	1	.....	...	1	.....
1 leg	6	1	...	1	5	40	...	...	40	5,254	1,893	174	6	2,073	3,181
1 leg and 1 foot	...	...	...	...	...	...	...	...	...	10	3	1	....	4	6
1 leg and 1 foot and use 2 arms	...	...	...	...	...	...	...	...	...	1	1	.....	...	1	.....
1 leg and use 1 arm	...	...	...	...	...	...	...	...	...	17	8	.....	....	8	9
1 leg and use 1 arm and 1 leg	...	...	...	...	...	...	...	...	...	2	1	.....	....	1	1
1 leg and use 2 arms	...	...	...	...	...	...	...	...	...	2	2	.....	....	2	.....
1 leg and use 2 arms and 1 leg	1	...	...	...	1	...	...	...	...	1	.....	.....	.....	.....	1
1 leg and use 1 leg	...	...	...	...	...	...	...	...	...	24	12	1	....	13	11
2 legs	1	...	...	...	1	1	...	...	1	56	23	3	....	26	30
1 foot	2	1	...	1	1	...	...	...	...	107	33	7	2	42	65
1 foot and use 1 leg	...	...	...	...	...	...	...	...	...	1	1	.....	....	1	.....
2 feet	...	...	...	...	...	...	...	...	...	23	10	3	....	13	10
Loss of use of—															
1 arm	93	4	...	4	89	41	...	...	41	6,352	1,953	230	315	2,498	3,854
1 arm and 1 leg	20	...	...	...	20	6	...	...	6	374	119	22	25	166	208
1 arm and 2 legs	4	...	...	...	4	5	1	1	4	74	31	5	5	41	33
2 arms	5	...	1	1	4	3	...	...	3	153	65	18	8	91	62
2 arms and 1 leg	2	...	...	...	2	1	...	...	1	25	14	2	1	17	8
2 arms and 2 legs	10	1	...	1	9	10	...	...	10	202	113	7	6	126	76
1 leg	111	6	3	9	102	75	...	...	75	4,408	1,377	296	303	1,976	2,432
2 legs	40	7	...	7	33	28	...	...	28	759	324	55	48	427	332
Total	308	20	4	24	284	230	1	1	229	23,041	8,110	1,011	720	9,841	13,200

APPLIANCES FOR DISABLED SOLDIERS.

During the past year the sum of $1,528.77 was expended for 192 appliances issued to disabled soldiers.

TRUSSES.

The number of trusses issued and fitted during the year was 1,054, at a cost of $7,807.44.

PROVIDENCE HOSPITAL.

The act of Congress approved June 6, 1900, appropriated $19,000 for the support and medical treatment of destitute patients in the city of Washington, D. C., under a contract to be made with this hospital by the Surgeon-General of the Army. The relief afforded under this appropriation was as follows:

Patients in hospital July 1, 1900	135
Admitted during the year	1,576
Total number treated	1,711
Average number admitted per month	142
Number remaining in hospital June 30, 1901	102
Total number of days' treatment afforded	46,794
Average number of days' treatment per patient	41
Average number of patients treated per day	128
Longest term of treatment (days)	365
Shortest term of treatment (day)	1
Number of patients in hospital during the whole year	23

ARMY AND NAVY GENERAL HOSPITAL, HOT SPRINGS, ARK.

Officers' division.—Three officers remained under treatment December 31, 1899—2 on the active army list and 1 on the navy retired list. Twenty-four were admitted during the calendar year 1900—Regular Army 9, Volunteer Army 2, army retired list 5, navy active list 5, and navy retired list 3. Twenty-seven officers were therefore treated during the year, against the same number in the year 1899. Twenty-one were returned to duty, or returned to residence much benefited by their treatment in the hospital; an average of 69.52 days, ranging from 4 days to 155 days. The maximum number treated at one time was 10, in December, 1900; the minimum 2, in September, 1900. Of the 6 remaining under treatment December 31, 1900, 4 belonged to the Regular Army, 1 to the Volunteer Army, and 1 to the navy retired list.

Enlisted men's division.—In this division there remained under treatment December 31, 1899, 58 men—42 belonging to the Regular Army and 16 ex-volunteers. Three hundred and eleven cases were entered for treatment, making the whole number treated during the year 369. Two hundred and nine of these cases consisted of rheumatism in its various forms, 61 diseases of the digestive system, 25 diseases of the nervous system, 27 malarial fevers and cachexia, and 47 other disabilities.

Eighty-one of the men were discharged on certificates of disability, 30 on expiration of term of service or by order of the War Department, 50 remained under treatment December 31, 1900—enlisted men 41, ex-volunteers 9—and 208 were returned to duty or, if ex-volunteers, returned to their homes very much improved.

THE UNITED STATES GENERAL HOSPITAL FOR THE TREATMENT OF PULMONARY TUBERCULOSIS AT FORT BAYARD, N. MEX.

In October, 1899, Fort Bayard, N. Mex., was, on my recommendation, discontinued as a military post, and its buildings were transferred to the Medical Department of the Army for conversion into a sanatorium or hospital for the treatment of cases of pulmonary consumption. As the abandonment of the post had been in contemplation for some years, the buildings were in poor condition and required many repairs and improvements to fit them for hospital use. These were speedily effected, and the hospital is now in excellent condition. The selection of Fort Bayard as a site for a sanatorium has been amply justified by the results. Its location in the dry mountainous region of southern New Mexico, at an altitude of 6,040 feet, affords a climate permitting comfortable outdoor life during the entire year. The mean maximum and minimum temperatures and the precipitation for the past decade were as follows:

Month.	Mean maximum.	Mean minimum.
	°	°
January	52.77	23.15
February	54.13	25.83
March	60.52	30.92
April	68.43	37.10
May	77.33	45.45
June	86.15	52.68
July	82.91	55.34
August	85.32	56.98
September	81.97	52.09
October	71.34	41.20
November	61.29	31.90
December	53.20	24.66
General average	69.56	39.79

During the year 1900 only 52 cloudy days were noted.

Precipitation.

	Inches.		Inches.
1891	19.30	1896	18.85
1892	8.89	1897	18.00
1893	15.47	1898	15.91
1894	9.12	1899	10.43
1895	15.09	1900	12.66

The following is from the report of Maj. D. M. Appel, surgeon, United States Army, in command of this Hospital:

Instructions to patients.—Consumption is an infectious disease caused by a germ which is found in the spit, therefore the spit, together with everything coughed up by patients, must be carefully destroyed. Should it be allowed to dry and in the form of dust float around in the air, millions of these germs would be set free, and would endanger not only those who are well, but would often reinfect the sick, and thus undo the benefit derived from months of care.

Spit only in your spit cup or into the large spittoons provided for that purpose; never on the floor, in the bath tubs, sinks, or closets, nor in your handkerchiefs.

Carry your own spit cup with you everywhere, spit into it carefully, to avoid having to wipe your lips, whiskers, or the edges or sides of your cup. Never swallow your spit.

The only safe method of disposing of the spit is by burning it, therefore the paper cups and spittoons must be burned when half filled and the frames washed frequently with carbolic solution. Should you by accident spit on the floor or bedclothes or spill your cup, report it at once to insure proper disinfection.

To be benefited by this most excellent climate you must live outdoors as much as possible, and always when indoors keep the windows open.

Go to bed early; take moderate exercise when not instructed to the contrary; eat your meals slowly and chew your food thoroughly.

Do not help yourself to food from any dish except your own plate with your own fork or spoon, but use those provided for that purpose. Try to refrain from coughing at meals. You can with slight effort do much to prevent it.

The use of stimulants and cigarettes is forbidden. Smoking and chewing tobacco in moderation is permitted. Whiskers and mustaches must be closely trimmed.

Patients not bedridden must observe the following rules:

1. They must occupy their quarters only from 7.30 p. m. until 8 a. m.
2. They must make their own beds and neatly arrange their personal belongings, none of which are to be left on the floors.
3. They must stay outdoors at least 8 hours daily.
4. They must not visit in quarters.
5. They must bathe at least once a week.

* * * * * * *

Each patient is provided with a spit cup of the pattern made by Seabury & Johnson, consisting of a tin frame with spring cover, in which is placed an impervious paper receptacle, and large covered spittoons with paper receptacles are scattered throughout the rooms and on the porches frequented by the patients. A shelf is fitted under each chair in the dining rooms, on which the spit cup is placed during meals. The spit cups, and also the dejecta from patients with intestinal tuberculosis, are destroyed in crematories, four of which are now in use.

Abundant good and nutritious food is provided, and the dairy furnishes an ample supply of milk. Patients are weighed every Friday. The weights are recorded, and the report of the gains and losses affords a good index of progress.

The old post hospital is occupied as an infirmary for bedridden cases, including not only those in which the disease is far advanced, but all febrile patients whose maximum daily temperature reaches 101° F. In a large majority of these cases, after a short period of absolute rest, the fever permanently subsides.

The treatment pursued consists mainly of outdoor life, ample good food, and rest. Regulated exercise is permitted when advisable. The ambulant cases are daily instructed in breathing exercises. Cod-liver oil with guaiacol is extensively administered, and in some cases guaiacol carbonate is prescribed in 1-gram doses twice daily. The laryngeal lesions, as a rule, do well with a simple spray of 1 per cent tricresol in liquid vaseline, which apparently prevents pyogenic infection, and the tuberculous lesion improves with the general condition. Otherwise the treatment is symptomatic. Tuberculin is used only for diagnostic purposes.

From October 3, 1899, to December 31, 1900, 283 patients were admitted, as follows:

Officers (including 1 retired)	6
Enlisted men, Regular Army (of whom 114 remained, after discharge from service, as beneficiaries of the Soldiers' Home, and 1 after retirement)	196
Discharged soldiers, as beneficiaries of the Soldiers' Home	49
Enlisted men, volunteers	23
Discharged volunteers, by special authority	2
Acting assistant surgeons, assigned to duty at hospital	2
Civilian clerk, assigned to duty at hospital	1
Civilian clerk, temporary admission authorized by Surgeon-General	1
Civilian residing at post	1
Female nurses	2
Total	283

Of the 283 patients admitted, 124 were discharged, 34 died, and 125 remained under treatment.

To elucidate the results better, the cases are divided into three classes, viz: (1) Cases exhibiting permanent afebrility, without tubercle bacilli in the sputum; (2) cases exhibiting permanent or approximately permanent afebrility, with tubercle bacilli (pure tuberculosis or a minor degree of mixed infection); (3) cases exhibiting permanent febrility, with tubercle bacilli (mixed infection).

Certain features common to all these cases are worthy of emphasis. The first and most striking is the apparent permanency of the different types. Cases in which the maximum daily temperature does not drop below 100° F. shortly after admission usually remain permanently febrile. These are true cases of phthisis pulmonalis, and the results in this class are no better than in less favorable climates. Cases afebrile on admission, or those where, following absolute rest, the temperature drops below the febrile point shortly after admission, also exhibit great permanency of type, and the same is true of the remaining class, viz, febrile cases without tubercle bacilli. In these last two types favorable results may be anticipated, especially in the latter.

The next feature which merits attention is the relatively insignificant rôle of a tuberculous family history as an etiologic factor in pulmonary tuberculosis, when contrasted with the importance of the lessened resistance resulting from a preexisting disease. A prominent feature, and one which militates against the best results at this hospital, is the limited period that patients remain under treatment, the average being but four and one-tenth months, and in such a markedly chronic disease this must be considered in the interpretation of the statistics. Many were discharged at their own request, convalescent and improved, who, after their discharge from the service, were unwilling to submit longer to the necessarily rigid rules and regulations of the hospital. Many also were unable to resist the pangs of nostalgia, due largely to the isolated location of the hospital and the aridity of the vicinity.

In 51 per cent of the cases there had been a history of pulmonary hemorrhages. When this is contrasted with the fact that they have occurred in but 15 cases at this hospital, it is evident that the prevalent opinion that residence in a high altitude is contraindicated in such cases has no foundation in fact. In 78 per cent of the cases the disease was contracted in the Tropics.

Reinfections, diarrheas, night sweats, and intercurrent diseases, owing to the hygienic environment, play an unimportant part in the course of the disease as manifested in this hospital. In 90 per cent of the cases there was evidence of the pulmonary affection in the conformation of the chest.

In five cases the diagnosis of pulmonary tuberculosis was not confirmed, as follows: In three the physical signs gave evidence of "healed tuberculosis," and the tuberculin test was negatived on admission. One patient had septic bronchitis and died of acute peritonitis of unknown origin, and the fifth had tuberculosis of the chest walls and pleura, without involvement of the lungs. In this case the tuberculin test was also negative on admission, and death resulted from rupture of an aortic aneurism. Of the remaining 153 patients who were discharged or died, 16 were under treatment less than one month, and are not, therefore, considered in this report of results, leaving 137 patients, of whom 24, or 17 per cent, died; 42, or 30 per cent, were unimproved; 33, or 23 per cent, were improved; 22, or 16 per cent, were convalescent; and 16, or 11 per cent, were clinically cured.

Patients are classed as convalescent when no tubercle bacilli are found after repeated examination, and, though active symptoms have almost disappeared, they still react to the tuberculin test. Those who, after all symptoms have disappeared, fail to react to the tuberculin test are recorded as clinically cured.

Of the 137 patients who died or were discharged, 30, or 22 per cent, exhibited perma-

nent afebrility, and when admitted had no tubercle bacilli in their sputum (class 1). In these the following facts were elicited on admission: Family history was negative in 23 and positive in 7. In 9 the pulmonary tuberculosis was complicated by other diseases of the lungs or pleura, viz, emphysema, fibrosis, chronic bronchitis, and pleuritis with effusion. In 1 there was tuberculosis of the peritoneum in addition to the pulmonary lesion. Secondary anemia was present in 14; hyperleukocytosis in 3. In none did the blood show degeneration of red cells or myelocytes. In all the presence of adventitious organisms in the sputum was a marked feature. These organisms, named in order of frequency of their occurrence, though several varieties are commonly found in one specimen, are: Staphylococci, streptococci, Micrococcus pneumoniae crouposae, Friedlander's bacillus, Micrococcus tetragenus, Leptothrix buccalis, and sarcinae. In 20 cases, or 66 per cent, the tuberculosis was secondary to a preexisting disease: Malaria ranked first, being a factor in 10; pneumonia next, in 7; dysentery in 2, and pleurisy in 1. In 22 patients, or 73 per cent, the pulmonary disease was evidenced by the conformation of the chest, viz, retraction of tissues over apices, drooping of one shoulder, narrowing of intercostal spaces, and rigidity of ribs; only 4 of this class presented tuberculous facies when admitted. In 22 the lesion was infiltration, and in the remainder infiltration plus consolidation. The diazo-reaction was absent in all. In 16 there was a history of pulmonary hemorrhage. In 22 the tuberculin test confirmed the diagnosis; in 2 cases, at first negative, tubercle bacilli subsequently appeared.

In contrast to the above data, which illustrate the condition on admission, the following facts were noted at the time of discharge: Twelve, or 40 per cent, of these 30 patients were clinically cured: 13, or 43 per cent, convalescent; and 5, or 16 per cent, unimproved. In 10 there were complicating pulmonary affections; this is 1 more than on admission, 1 patient developing emphysema while under observation. Anemia was present in 4, which is 10 less than on admission. Hyperleukocytosis was present in 2. In 1 patient tubercle bacilli did not appear in the sputum until 5 months after admission. Adventitious organisms were present in the sputa in 12, which includes all who had any expectoration on discharge. None had tuberculous facies at the time of discharge, but 18 presented evidence of disease in conformation of chest, which is 4 less than on admission; 12 presented the physical signs of a lesion, best described by the term "healed tuberculosis;" 17 still presented the physical signs of infiltration, and 1, which is 6 less than on admission, had infiltration plus consolidation. Only 1 of this class had a hemorrhage while under observation, notwithstanding that over 50 per cent presented a history of hemorrhage. In 9 of the 12 discharged as clinically cured, the tuberculin test was negative. The other 3 objected to the tuberculin test, but were entirely without symptoms of active disease, and it was therefore considered unnecessary to insist upon its administration. Four of this class had a relapse, in 3 tubercle bacilli were present for a short time, and they were found in but 1 at the time of discharge. The diazo reaction was still absent in all.

Conclusions in regard to afebrile patients without tubercle bacilli (class 1).—This class presents a pure type of tuberculosis without mixed infection. Slight secondary anemia is often present, but is never marked or constant. Degenerated red corpuscles are never present, abnormal leukocytes are very rare, and when found are apparently accidental and ephemeral, and the same is true of hyperleukocytosis. Adventitious organisms in the sputum are a permanent feature while expectoration continues, and they therefore bear no relation to the presence or absence of mixed infection, as there is no mixed infection in this class.

The typical lesion is a slight infiltration of one apex, with or without signs of activity, though some consolidation is occasionally encountered. Increased density, occasionally associated with moisture over the affected area, even after the patients have passed the tuberculin test and are clinically cured, is uniformly present. A history of previous hemorrhage occurs in this class as often as in others, but a hemorrhagic tendency is not exhibited. The prognosis in this class is very good, as evidenced by 12 clinical cures and 13 discharged convalescent before complete arrest of the disease could be reasonably expected. In this class the diazo-reaction is never observed. The average daily maximum temperature is 98.9° F., which is evidence that pure uncomplicated tuberculosis is an afebrile affection.

In the 2 cases where the tuberculin test was negative on admission, tubercle bacilli subsequently appeared, possibly as the result of reinfection in a susceptible subject. In one case this is the most probable explanation, for the tubercle bacilli did not appear until five months after the test; this patient was the only one of this class discharged with tubercle bacilli in the sputum. In the other it is hardly so applicable, for the tubercle bacilli were found within a week after passing the test and apparently as a result of the action of the tuberculin; however, within a few weeks the

bacilli disappeared, the patient again passed the test, and was finally discharged clinically cured. In this case also the tuberculin test failed to demonstrate the existence of tuberculosis. In one patient in whom there was complicating fibrosis and arteriosclerosis the tuberculin reaction had an unfavorable influence upon the subsequent course of the disease, though in this case tubercle bacilli were never found, and the patient was discharged unimproved. In still another case a negative result of the tuberculin test was followed by an evening temperature slightly above 99° F. for several weeks, though it subsequently fell to normal.

Of the second class, afebrile cases with tubercle bacilli, 59 patients were discharged. In these the general course of the disease was afebrile, and when fever occasionally occurred it was always amenable to rest treatment.

The following facts were elicited from them on admission: In 45 the family history was negative, in 1 unknown, and positive in the remaining 13. In 4 there were complicating affections of the lungs. In 3 there was chronic laryngitis. In 10 there were other complications, including malaria, cerebral syphilis, chronic nephritis, hernia, anal fistula, dementia, otitis media, and hemiplegia. There was tuberculosis of other organs in 8, as follows: Testicles 2, peritoneum 1, larynx 2, inguinal glands 1, and intestinal tuberculosis 2. In 42 there was secondary anæmia. In 35 there was hyperleucocytosis. In 9 there was degeneration of red cells, and myelocytes were present in 5. Adventitious organisms were present in the sputum of 12. The pulmonary tuberculosis was preceded by some other disease in 40, or 68 per cent. As in the previous class, malaria led, being the inciting cause in 23, malaria and dysentery together in 4, chronic diarrhea in 3, influenza in 2, catarrhal jaundice in 1, perineal abscess in 1, tuberculosis of cervical glands in 1, and pneumonia in 5. Tuberculous facies was present in 15. In 52 there was evidence of the pulmonary disease in the conformation of the chest. In 30 there was a history of hemorrhage. The diazo-reaction was present in 3. The lesion in 24 was infiltration alone; in 25 there was infiltration plus consolidation, and in the 9 remaining there was infiltration, consolidation, and cavities.

Their condition on discharge was as follows: None of these patients died; 18, or 29 per cent, were unimproved; 28, or 48 per cent, were improved; 9, or 16 per cent, were convalescent, and 4, or 6 per cent, were clinically cured. None of this class ever became permanently febrile. In 20 there was secondary anæmia, or 15 less than on admission. Hyperleucocytosis was present in 22, or 15 less than on admission. Neither degeneration of red cells nor myelocytes were present in any. Tubercle bacilli were absent from the sputum in 10. In 4 there was no expectoration. Adventitious organisms were present in 13, and were mostly confined to those patients in whom tubercle bacilli had disappeared. Tuberculous facies was present in 13. Evidence of disease in conformation of chest persisted in 45, or 7 less than on admission. At the time of discharge the lesion in 4 was "healed infiltration," infiltration alone in 30, consolidation plus infiltration in 17, and cavities still persisted in 8. There was therefore a marked improvement in the character of the lesion in this class, particularly in the resolution of consolidated areas. The least change occurred in the cavity cases, and they of course present the most unfavorable type. In 6, hemorrhages occurred while under observation. The tuberculin test was negative in 2 at the time of discharge; the other 2 discharged clinically cured objected to the tuberculin test, and it was not considered necessary to insist upon its administration. The diazo-reaction persisted in but 1 case, although this patient improved. There was no relapse in this class. The average maximum daily temperature was 99.5° F.

Conclusions in regard to afebrile patients with tubercle bacilli.—This class presents either a pure type of pulmonary tuberculosis or minor degrees of mixed infection. The latter is readily and accurately estimated by the degree of hyperleucocytosis, which, as has been seen, was present in the majority of these cases on admission. That mixed infection in a minor degree, as in this class, is amenable to treatment is illustrated by the smaller number presenting hyperleucocytosis at the time of discharge and by the following results: Four clinically cured, 9 convalescent, and 28 improved, out of a total of 59. This is preeminently the type of the disease in which time is required to effect cure or arrest, and in which it is so difficult to impress the fact upon the patients, owing to the absence of pain or other distressing symptoms. The influence of other tuberculous lesions was apparently slight, even in the few cases where such complications occurred. Of 7 that presented tuberculosis of other organs only 3 were discharged unimproved; in one case with laryngeal ulceration, and in another with genitourinary involvement, the improvement was remarkable.

Secondary anemia, a marked feature of these cases, disappeared in 50 per cent of those who exhibited it on admission. Adventitious organisms in the sputum were confined mostly to the most favorable cases, and became a constant feature when the tubercle bacilli disappeared.

The tendency of this type is toward recovery, as evidenced by the fact that none died, and but 17 out of 59 were discharged unimproved. The diazo-reaction occurs rarely, and only in the least favorable cases.

Of the third class, cases exhibiting permanent febrility with tubercle bacilli, 48 were discharged or died. In them the facts elicited on admission were as follows: The family history was negative in 35 and positive in the remaining 13. In 6 there were complicating diseases other than tuberculosis. In 12 there was tuberculous involvement of other organs, of the larynx in 9. Secondary anæmia was present in all; hyperleucocytosis in all; degeneration of red cells in 15; myelocytes in 6, and adventitious organisms in the sputum of 14. In 28 the tuberculosis followed some other disease. Again malaria led, being a solitary factor in 10 cases, malaria with dysentery or chronic diarrhea in 3, dysentery in 4, pleuritis in 3, pneumonia in 2, typhoid fever in 2, chronic diarrhea in 2, measles in 1, and appendicitis in 1. All of these cases presented tuberculous facies, and all gave evidence of the disease in the conformation of the chest. There was a history of pulmonary hemorrhage in 20. The diazo-reaction was present in 23.

Of the 48 in this class, 24, or 50 per cent, died; 20, or 42 per cent, were discharged unimproved, and 4, or 8 per cent, improved in general condition. None was cured or discharged convalescent, and 13 had tuberculosis of other organs, 1 more than on admission. This patient developed intestinal tuberculosis while under observation. None ever became afebrile. All those discharged presented anæmia and hyperleucocytosis, 19 had degeneration of red cells, and in 6 there were myelocytes. In 1 tubercle baccilli were absent from the sputum, but were found in pus withdrawn from the pleural cavity. Adventitious organisms were still present in 10. In 4, all of whom died, hemorrhages occurred while the patients were under observation. The diazo-reaction was present before death or discharge in 30. Consolidation, infiltration, and cavity or cavities were present in 38 cases; 9 had consolidation and infiltration, and but 1 infiltration alone. The average maximum daily temperature in this class was 101.5° F., which is much lower than is commonly observed among similar cases in lower altitudes.

Conclusions.—The family history does not assume a more important place in this than in other types of the disease. Tuberculosis of other organs is more frequently present, particularly laryngeal tuberculosis, and though the latter is not directly a cause of death it contributes to the fatal termination. Hyperleucocytosis and more or less severe anæmia are constant features. As might be foreseen, degeneration of red cells as a manifestation of advanced secondary anæmia is present more frequently than in any other class, but its absence can not be interpreted as indicating a favorable prognosis. This is likewise true of the presence of myelocytes in the blood and the diazo-reaction in the urine. Another fact readily anticipated from the nature of the cases in this class is the constant evidence of disease in the conformation of the chest and the tuberculous facies.

Adventitious organisms in the sputum, if they bear any relation to mixed infection, would certainly be a feature of this class, which is undoubtedly one of mixed infection, and yet they were absent in the large majority of cases, and when present were apparently accidental and without relation to the type. With a death record of 50 per cent and a hopeless prognosis in the remainder, the futility of climatic treatment for this class is unquestionable.

Of the 125 patients remaining under treatment December 31, 1900, in 2 the diagnosis was not confirmed, as the tuberculin test was negative on admission, and they were apparently cases of "healed tuberculosis." Twenty-three had been under treatment less than one month, leaving 100 cases for consideration, with results as follows: Twenty-six unimproved, 48 improved, and 26 convalescent.

Of the first class, afebrile cases without tubercle bacilli, there were 23 patients. In these the following facts were elicited on admission: In 20 the family history was negative and positive in 3. Complicating pulmonary affections existed in 7, and other complicating diseases in 4. There was tuberculosis of other organs (inguinal glands) in but 1; 13 presented varying degrees of secondary anæmia; there was hyperleucocytosis in 3. Degeneration of red cells or myelocytes were not observed in this class. Adventitious organisms were present in the sputa of 19, the other 4 having no expectoration. In 18, or 78 per cent, the tuberculosis was preceded by another disease, malaria in 7, dysentery in 5, pleuritis in 2, pneumonia in 1, yellow fever in 1, chronic diarrhea in 1, and inflammatory rheumatism in 1. Tuberculous facies was absent in all. In 17 there was evidence of the disease in the conformation of the chest. The lesion was infiltration alone in 21; in 2 infiltration plus consolidation. In 7 there was a history of pulmonary hemorrhage. The tuberculin test was positive in 22; the one case in which it was negative on admission gave a characteristic reaction later. The diazo-reaction was absent in all.

Conditions December 31, 1900: Four, or 17 per cent, were unimproved; 19, or 83 per cent, were convalescent; complicating pulmonary affections persisted in 6. The tuberculous inguinal glands had been removed by operation. Anæmia persisted in 6, 7 less than on admission; hyperleucocytosis in 2, 1 less than on admission. Tubercle bacilli appeared in 6 and were still present in 3 of these. In 6 expectoration had ceased. In 13 adventitious organisms persisted. The lesion remained unchanged in all but 2, in which consolidation heralded the appearance of tubercle bacilli in the sputum. In no case had a hemorrhage occurred since the patients were under observation.

Of the second class, afebrile patients with tubercle bacilli, there were 63 under treatment. The following facts were elicited on admission: The family history was negative in 49 and positive in 14. In 4 there were complicating pulmonary diseases; in 21 there were other complications. In 5 there were tuberculous lesions of other organs—the intestines, tonsils, lower jaw, testicle, and larynx. Secondary anæmia was present in 40, hyperleucocytosis in 39, degeneration of red cells in 3, and myelocytes in 1. Adventitious organisms were present in 19. In 41, or 83 per cent, the tuberculosis followed some other disease—malaria in 24, dysentery in 5, chronic diarrhea in 3, pneumonia in 2, pleuritis in 2, chronic bronchitis in 1, influenza in 2, typhoid fever in 1, and syphilis in 1; 24 patients presented tuberculous facies. In 60 there was evidence of the disease in the conformation of the chest. The lesion in 31 was infiltration, in 27 there was infiltration plus consolidation, and in the remaining 5 cavities were present. Thirty-six presented a history of hemorrhage. The diazo-reaction was present in 5.

Their condition December 31, 1900, was as follows: Thirteen, or 20 per cent, unimproved; 44, or 69 per cent, improved, and 6, or 9 per cent, convalescent. Complicating diseases of the lungs persisted in 4. In 13, 8 less than on admission, other complications remained. In 4, 1 less than on admission, there were still other tuberculous complications, the lesion of the lower jaw having completely healed. Twenty-five, 15 less than on admission, were anæmic, and 31, 8 less, had hyperleucocytosis. Two had degeneration of red cells and myelocytes. In 6 the tubercle bacilli had disappeared from the sputum. In 19 there were adventitious organisms in the sputum. Nineteen, 6 less than on admission, had tuberculous facies. Nearly all gave evidence of the disease in the conformation of the chest. In 28 there was infiltration alone, in 26 infiltration plus consolidation, and in the remaining 9 cavities, practically the same as on admission. Four had pulmonary hemorrhage while under observation. Six presented the diazo-reaction, 1 more than on admission. One patient relapsed after having become convalescent.

Of the third class, presenting permanent febrility and tubercle bacilli, 14 remained under treatment December 31, 1900. The following facts were elicited on admission: The family history was negative in 12 and positive in 2. Five presented complications other than tuberculosis. There was tuberculosis of the larynx in 2, and in 1 there was tuberculous pyopneumothorax. Anæmia and hyperleucocytosis were present in all, degeneration of red cells in 2, myelocytes in 1, and adventitious organisms in but 5. In 9, or 64 per cent, there was a history of preceding disease—malaria in 7, pneumonia in 1, and pleuritis in 1. Tuberculous facies was present in all but 1, and evidence of the disease in the conformation of the chest in all. In 6 the lesion was consolidation and cavity; in the remainder consolidation plus infiltration. In 8 there was a history of pulmonary hemorrhage. The diazo-reaction was present in 6.

Their condition December 31, 1900, was as follows: Nine, or 64 per cent, were unimproved; 4, or 28 per cent, improved in general condition, and 1 convalescent. Three presented other complications, 2 less than on admission, in which malaria and dysentery had disappeared. Three still presented complicating tuberculosis, 1 became afebrile, 10 continued anæmic—4 less than on admission; 11, or 3 less, had hyperleukocytosis, 1 had degeneration of the red cells, and 1 presented myelocytes. Tubercle bacilli had disappeared from the sputum in 1, adventitious organisms were present in all but 2, 12 had tuberculous facies, and the entire number had evidence of the disease in the conformation of the chest. In each one the lesion was the same as on admission. Two had pulmonary hemorrhage while under observation, and 7 had the diazo-reaction.

In general, it may be said that the prognosis of these patients is a trifle better than for those of the same type discharged, owing to a process of selection, only the most favorable remaining; but even in these there is little prospect of ultimate cure.

The case of the patient who became convalescent and in whom the tubercle bacilli disappeared is worthy of note. Here there was pyopneumothorax of the left chest. For months the patient was bedridden, expectorating from one-half to 1 liter of offensive pus daily. At one time his weight was reduced to 89 pounds, the evening temperature was constantly from 101 to 103° F., but his appetite, though capricious,

remained. Expectoration suddenly ceased almost entirely, the patient improved and now weighs 136 pounds, and except for a badly injured left lung is practically well.

The combined results of 236 patients, who had been under treatment for one month or over, are as follows: Twenty-four, or 10 per cent, died; 68, or 28 per cent, are unimproved; 80, or 33 per cent, are improved; 48, or 20 per cent, are convalescent, and 16, or 6 per cent, are clinically cured.

The report from this hospital for the fiscal year ended June 30, 1901, is as follows:

Remaining July 1, 1900.

Regular Army:		
Officers	3	
Enlisted men (of whom 26 remained as beneficiaries of the Soldiers' Home after discharge from service)	37	
Female nurses	1	
		41
Beneficiaries of the Soldiers' Home		38
Total		79

Admitted during the year.

Regular Army:		
Officers (including 1 retired)	3	
Contract surgeons	1	
Enlisted men (of whom 107 remained as beneficiaries of the Soldiers' Home after discharge from service)	188	
Female nurses	1	
Retired enlisted men	1	
Civilians	5	
		199
Volunteers:		
Officers (Porto Rico Battalion)	1	
Enlisted men (of whom 4 remained temporarily after discharge from service)	37	
		38
Beneficiaries of the Soldiers' Home (133 enlisted men remained as beneficiaries of the Soldiers' Home after discharge from the service, and 1 remained after being retired)		28
Total		344

During the year 184 patients were discharged, as follows:

Regular Army:		
Officers	1	
Enlisted men discharged from service	17	
Enlisted men returned to duty	5	
Enlisted men retired	2	
Female nurses	2	
Civilians	4	
		31
Volunteers:		
Enlisted men discharged from the service (of whom 4 remained temporarily after discharge)		33
Beneficiaries of the Soldiers' Home		120
Total		184

Died during the year.

Enlisted men of Regular Army	15	
Enlisted men of Volunteers	4	
Beneficiaries of the Soldiers' Home	21	
		40

Remaining June 30, 1901.

Regular Army:		
Officers (including 1 of Porto Rico regiment)	6	
Contract surgeons	1	
Enlisted men	54	
Civilians	1	
		62
Beneficiaries of the Soldiers' Home	58	
		120
Total		344

Of those who died, 10 were under treatment less than one month, as follows:

Enlisted men of the Regular Army	6
Enlisted men of Volunteers	3
Beneficiaries of the Soldiers' Home	1
Total	10

Of the 184 patients discharged, 17 were under treatment less than one month. The remaining 167 were under treatment an average of 5.4 months, and their condition on discharge was as follows:

Clinically cured	10
Convalescent	26
Improved	73
Not improved	58
Total	167

During the year an antiphthisic serum, by a St. Louis, Mo., firm, was tried in 33 cases, the patients willingly submitting to the treatment. Contract Surgeon E. S. Bullock conducted the experiments, and reported his results, as follows:

With two exceptions (in which the serum was used on the urgent request of the patients) the cases treated were selected from the more favorable cases, and all were febrile. In 10 cases the treatment was discontinued within a few days, the patients being discharged or objecting to its continuance.

The serum was administered daily in initial doses of 0.005 and increased at the rate of 0.005 per week to 0.015, which dose was continued during the remainder of the treatment.

In a majority of the cases a disagreeable reaction resulted in five or six days, consisting of a rise of temperature, malaise, headache, and cutaneous irritation (either urticarial or erythematous). In four cases there was an extremely distressing, though ephemeral, instantaneous reaction, in which there was an intense fullness in the head, flushing of the face, pain in the lumbar region, and marked dyspnœa, in all probability due to the introduction of the serum directly into the circulation.

In six cases the treatment was discontinued after an average of 18 days on account of a permanent rise of temperature, which subsided shortly after its discontinuance.

In five cases there was no apparent change in the condition of the patient during the treatment, which was continued 45 days in two; 63, 89, and 170 days, respectively, in the others—an average of 82 days.

In six cases the condition of the patient was aggravated during the treatment. In these it was continued 36, 46, 62, 71, 77, and 134 days, respectively—an average of 71 days.

In six cases the patients improved both before and during the treatment, which was continued 170 days in three; 31, 51, and 70 days, respectively, in the others—an average of 110 days. The favorable results in these six cases were no better than in many similar cases under treatment in this hospital without the use of serum.

The following report from the attending surgeon United States Soldiers' Home, Washington, D. C., shows the provision made for the care and comfort of the inmates of that institution when sick:

REPORT ON THE BARNES HOSPITAL, UNITED STATES SOLDIERS' HOME, WASHINGTON, D. C., JANUARY 30, 1901, BY MAJ. L. A. LA GARDE, SURGEON, UNITED STATES ARMY.

A description of the hospital devoted to the care of the sick among the inmates of the Soldiers' Home, the institution which forms a retreat for disabled discharged soldiers of our Regular Army, would seem appropriate at a time when the Army, as recently enlarged, is furnishing it with more patients than ever before.

The care of the discharged army invalid, the erstwhile recruit, seasoned soldier, and finally, the faithful old warrior who willingly sacrificed the best years of his life to his country's military service, is ever a matter of public interest, and it becomes especially so to the Army and its medical department. The average number of inmates in the Home for each of the years 1897, 1898, 1899, 1900, was, respectively, as follows: 722, 751, 807, 838. The figures show a marked increase in the last two years as a result of a larger army and casualties incident to recent campaigns in war.

Number of inmates in the United States Soldiers' Home June 30, 1901, with their length of active service.

Service.	Number.	Service.	Number.
5 months	1	14 years	10
6 months	4	15 years	21
7 months	2	16 years	20
8 months	3	17 years	14
9 months	4	18 years	26
10 months	2	19 years	29
1 year	23	20 years	101
2 years	47	21 years	71
3 years	64	22 years	47
4 years	14	23 years	38
5 years	38	24 years	30
6 years	16	25 years	25
7 years	12	26 years	23
8 years	21	27 years	9
9 years	20	28 years	6
10 years	15	29 years	2
11 years	20	31 years	2
12 years	22		
13 years	24	Total	826

Age of inmates.

Years.	Number.	Years.	Number.
21 years	1	55 years	41
22 years	2	56 years	32
23 years	1	57 years	40
24 years	2	58 years	28
25 years	5	59 years	31
26 years	3	60 years	17
27 years	5	61 years	33
28 years	5	62 years	18
29 years	10	63 years	30
30 years	12	64 years	20
31 years	5	65 years	29
32 years	5	66 years	22
33 years	6	67 years	14
34 years	6	68 years	17
35 years	13	69 years	13
36 years	8	70 years	10
37 years	4	71 years	18
38 years	2	72 years	9
39 years	5	73 years	11
40 years	7	74 years	6
41 years	2	75 years	10
42 years	7	76 years	8
43 years	8	77 years	5
44 years	3	78 years	10
45 years	12	79 years	2
46 years	19	80 years	3
47 years	9	81 years	4
48 years	19	83 years	1
49 years	14	85 years	1
50 years	13	88 years	1
51 years	11	94 years	1
52 years	33		
53 years	40	Total	826
54 years	44		

BARNES HOSPITAL, FRONT VIEW.

Nativity of inmates.

Born in—	Number.	Born in—	Number.
United States	339	Denmark	5
Ireland	218	Norway	5
Germany	156	France	10
England	36	Russia	5
Scotland	9	Belgium	2
Austria	8	Roumania	1
Canada	12	East India	1
Sweden	9		
Switzerland	8	Total	820

The Barnes Hospital, devoted to the care of the sick of the Home, may be thus described:

The hospital, first occupied in 1876, is built of brick and consists of a central administration building, measuring 52 by 55 feet, two pavilion wings, each 64 by 29 feet, having two end towers, and an annex. The central building has a basement, three stories, and a mansard roof, while the rest of the structure, including the annex, has two stories, with basement and mansard. Many changes have been made in the hospital since it was first occupied. These changes have reference to heating and ventilation, lighting, new furniture, elevator service, introduction of cold storage in place of ice, the use of steam in lieu of coal and gas, alteration in kitchen, etc. The annex, which constitutes the principal addition, was occupied in April, 1899, thereby increasing the capacity of the hospital from 82 to 112 beds.

Heating and ventilation.—The hospital is now heated by hot water, with direct indirect radiation, instead of the inverted-siphon system, with provision for heating inlet air from chambers heated by hot-water pipes. The latter, including the boilers pertaining to the heating system, needed renewal after long usage, so that the simpler method referred to was adopted. The exit air from the wards is carried by ducts in the ceiling to a central shaft, which receives heat from the smokestacks of the heating apparatus.

Lighting.—Lighting by gas was supplanted by electric lighting in 1898. The power is owned by the Home. New white-enameled combination pendants were put in place of the old gas chandeliers in 1899.

New furniture.—The old-style iron bunks and wooden tables for the wards have been replaced by modern white-enameled beds and glass-top tables. Rolling chairs have been added to the wards and for use in the grounds; the men's boxes, formerly painted a yellow color, were painted with white enamel.

Elevator service.—In a hospital having so many cripples and long-lived invalids the effort to ascend and descend stairways is always irksome. This was especially true of the Barnes Hospital, in which the sole opportunity to relieve the daily routine of ward life lay in an airing on the porch. The construction of the annex afforded a central location—at the junction of the two buildings—for an elevator, which is run by hydraulic pressure. Many invalids who seldom left the building are now free to go about the grounds, and to go to their meals three times a day, when formerly their food had to be carried to them—a practice which, aside from many other objections, was very laborious to the ward nurses.

Cold storage.—The value of cold storage in institutions used as habitations in recent years has been so thoroughly demonstrated on sanitary and economic grounds that the opportunity to embrace this modern convenience was very wisely decided upon in the construction of the annex. The machine in use is the Remington, which enables us to make 200 pounds of ice per day, and supplies in addition cold storage to two boxes for food stuffs in the commissary and culinary departments and one box for the reception of cadavers in hot weather.

Steam.—Upon the construction of the annex in 1899 the proximity of the pump house to the hospital rendered the introduction of steam feasible for a number of uses. (1) Formerly the bath water for all the bathrooms was heated by three distinct fires in the basement. This practice entailed a good deal of labor aside from being a source of much nuisance. Water for bathing purposes in all the rooms and for use in kitchen and dining room is now heated by a steam coil in a large boiler centrally located in the basement. (2) The introduction of steam, as stated, enables us to operate the cold storage at a fractional cost, and it furnishes heat for the bain-marie and plate warmer in the kitchen and the sterilizers in the operating room.

Alteration of kitchen.—With other recent changes the partition in the kitchen which divided it from the pantry was torn down, converting the two rooms into one large room. The old wooden floor was taken up and a new terrazo floor put in its place to correspond to that in the dining room. The cooking range, which was small before,

was increased by another oven, and this addition to the cooking area necessitated a larger hood to carry off the heat and vapors. The kitchen has been further provided with a bain-marie, plate warmer, and an overhead rack on which to hang cooking utensils, tea and coffee urns, etc.

The annex.—The annex is composed of three stories and basement. The basement is divided through its length and width by halls, and it is further divided into rooms for supplies, heating apparatus, cold storage, and machinery for elevator. The first floor is divided in its length by a well-lighted hall, 5 feet by 54 feet, which connects with 8 commodious rooms, 5 of which are used as surgical wards, each containing 2 beds, while the other 3 are devoted to the use of the nurses and the storage of linen. At the northern exposure of the building are located the water-closet and bath, the etherizing, operating, and sterilizing rooms, also the laboratory for clinical microscopy and X-ray apparatus. The second floor contains a medical ward, 30 by 54 by 14 feet, with 14 beds; 2 isolation wards, one 16 by 20 feet and the other 16 by 18 feet, 3 beds to each; ward master and nurses' rooms, a special diet kitchen, linen room, and bath and water-closet. Before the construction of the annex the dining room was located on the second floor of the administration building, under the kitchen. The room was small, seating but one-third of the men at a time, so that it was necessary to set the table three times for each meal. The construction of the annex gave the opportunity to put the dining room on the same level with the kitchen. All of the space which corresponds to the ward below was devoted to this purpose. There is now a spacious dining hall, 54 by 29 feet, with a seating capacity of 104, which can be increased to 130, when needed, without crowding. The rest of the space at the end of the building is devoted to bathroom and water-closet for use of the dining room and kitchen help, a pantry, a china closet, sleeping rooms for the dining-room men, etc.

The advances in the field of diagnosis in recent years have rendered thoroughly equipped laboratories for research into the causes of disease an indispensable feature of all general hospitals. With this idea in view it was determined to place the Barnes Hospital on a footing with the leading hospitals of this country. Under the active supervision of Dr. A. B. Herrick, the clinical assistant, we now have a well-appointed laboratory for clinical microscopy, supplemented by a Röntgen-ray apparatus and photographic department.

The pathological and anatomical material is worked up and recorded. Analyses are made of the urine, sputum, gastric juice, and stools, which are most valuable for diagnostic purposes; also bacteriological cultures are taken when necessary, as a further aid to diagnosis. The Edison break-wheel X-ray machine formerly in use is about to be replaced by a static machine more suited to a fixed hospital. Bullets have been located, fractures reduced and placed in apposition under the direct light of the X-ray; also, later, they are examined, by means of the ray, directly through dressings.

Operating room.—The operating room occupies the space at the north end of the annex. It is a spacious, well-lighted room, with two anterooms in which to etherize patients and to conduct the sterilizing of instruments, dressings, etc. The furniture and fixings were supplied by the Kny-Scheerer Company, of New York, and the appointments generally are of the best.

The medical ward has 14 beds and two isolation rooms of 3 beds each, with a ward master and 4 nurses. The surgical ward, of 10 beds, has a ward master and 3 nurses. The two upper convalescent wards (C and F) have each 16 beds and two small rooms of 1 bed each. A ward master is in charge of each ward. E ward, comprising seven small rooms, has a nurse in charge. B ward, of 12 beds, on the second floor, is used for old, chronic cases, most of whom are unable to go to their meals, and is in charge of a ward master and 2 nurses. A and D wards, on first floor, of 13 beds each, with ward master and 1 nurse to each, are for chronic cases and men on wheeled chairs who can go to their meals by the elevator.

The kitchen, on the third floor, has a chief and second cook, and 3 men as dishwashers, preparing vegetables, etc. It is supplied with a modern range of sufficient capacity for over 150 men, and all modern conveniences. The dining room is also on the third floor, connected with the kitchen by a corridor, and food is brought direct to the tables on a large wheeled car, which later is used to take the dishes, etc., to the pantry to be washed. It is in charge of a chief and 5 assistants.

The duties of the steward are to superintend the entire hospital, under the orders of the surgeon in charge. He has charge of all the property and all the employees, and keeps the hospital in order; is responsible for the care of instruments, medical supplies, books, and everything in the hospital. He also keeps the records, with such clerical assistance as may be necessary. He has under him a druggist to dispense the medicines and a commissary-sergeant to attend to the rations and laundry

work, a chief cook, chief of dining room, chief of nurses, firemen, laborers, etc. He consults daily with the surgeon in charge with regard to all matters of hospital administration, and receives his instructions.

The following list is given to show the cause of mortality among men who have engaged in the military service. Like all mortuary statistics, in former times these have been imperfectly kept, and therefore no reliable deductions can be made from them. The list is here given for what it is worth. Reference to the present method of observing the causes of death will be made later.

From January, 1876 to June 30, 1901 (25½ years), there were 914 deaths, as follows:

Disease.	Number.
Abscess:	
Brain	2
Pancreas	1
Psoas	2
Alcoholism	10
Aneurism, aorta	34
Apnea	1
Apoplexy	29
Arthritis, chronic	1
Asthenia	1
Asthma	1
Bright's disease	38
Bronchitis	10
Cancer:	
Axilla	1
Bowels	4
Bladder	1
Epithelial	9
Gall bladder	1
Larynx	1
Liver	6
Mesentery	5
Parotid	1
Prostate	1
Rectum	1
Stomach	18
Cerebral hemorrhage	12
Cholera morbus	1
Cirrhosis of liver	15
Congestion of brain	24
Consumption	220
Cystitis, chronic	5
Diabetes mellitus	8
Diarrhea, chronic	12
Disease of heart, mitral	10
Disease of heart, valvular	74
Drowned	11
Edema of glottis	1
Embolism	9
Empyema	1
Enteritis	6
Epilepsy	2
Erysipelas	2
Fatty degeneration of heart	4
Fractures:	
Hip	2
Neck	1
Skull	3
Fever:	
Malarial	2
Typhoid	1
Frozen to death	3
Gangrene:	
Pulmonary	5
Senile	5
Gastritis	15
General debility	3
Hepatitis	8
Hematemesis	3
Hemiplegia	2
Hemophilia	1
Hernia, femoral, strangulated	1
Hip joint, disease of	2
Lateral sclerosis	1
Leukemia	1
Lockjaw	1
Locomotor ataxia	4
Meningitis	9
Nerve disease, exhaustion from	2
Obstruction of bowels	2
Old age	55
Paralysis:	
General	17
Of heart	7
Paraplegia	4
Pericarditis	4
Peritonitis	8
Pleurisy	4
Pneumonia	82
Pyemia	1
Rheumatism, chronic	3
Rupture of heart	2
Scalds	2
Septicemia	1
Stricture of rectum	1
Suicide	25
Sunstroke	2
Syphilis, tertiary	8
Tumor of brain	7
Wounds:	
Gunshot	1
Incised	1

Clinical report.—The cases treated at this hospital may be divided into two main groups: (a) Those affecting the old men, and being essentially the diseases due to degeneration of the various systems; (b) those affecting the young men, and being almost entirely either the remote effects of gunshot wounds or invalidism, etc., following tropical service. In the first group we find chronic affections of the lungs, rheumatism, the scleroses of the heart, arteries, and kidney, and various degenerations of the nervous system, especially tabes dorsalis. The second group is composed of, first, the various remote effects of gunshot wounds; second, neuritis, myelitis, debility, etc., following the various fevers; third, chronic dysentery. The main diseases affecting both groups are malarial fever, influenza, pleurisy, and pneumonia.

The cases of influenza occurring during the past year were of a very mild character, there being no fatal results from the disease. It was usually of a febrile and painful form, the mucous surfaces appearing only to suffer slightly. One case is worthy of mention from its close resemblance to typhoid fever, from which it differed by absence of Widal reaction and the typhoid rash.

Affections of the lungs are of very common occurrence, one of the most frequent

complaints being a "stitch in the side." The attacks of pleurisy are of a very light character. The disease is usually a dry inflammation, running a short course of severe pain and fever, and clearing up in a few days. In a few cases it is of a more severe character and runs a prolonged course, with fever, night sweats, etc. The tubercle bacilli are found, often only after numerous careful examinations. Pneumonia generally occurs here among the aged, and rarely appears in the typical form. Usually the consolidation is not so complete and firm that the breath sounds have that characteristic tubular quality, but have rather a bronchial modification, with dullness and increased fremitus. The fever is usually low, often dropping to subnormal. Chronic bronchitis forms a large part of the lung cases. It is of a very obstinate form, usually obscure in its origin and very resistant to any treatment. One form is often associated with slight attacks of pleurisy. In this association inflammatory processes due to the tubercle bacillus are always carefully sought after, often with positive results. This, together with the very acute, almost pneumonic type, forms the usual methods of onset of tuberculosis seen at this hospital. The diagnosis of the latter disease is never positively affirmed without finding the bacilli in the sputum. In doubtful cases the tuberculin reaction is tried. In this connection the appearance of the lung when viewed by the X-ray is of interest. The difference between the normal lung and one but slightly infiltrated by the tubercular process is easily determined and best appreciated by direct view of the thorax with the fluoroscope. Cavities in the lung are very definitely revealed. The tuberculous cases are sent to the general hospital at Fort Bayard, N. Mex., as soon as the diagnosis is assured. But, besides these, there are every year a few cases which are admitted in the last stages, or in which the disease assumes such a malignant form that they have to be treated here, necessitating an isolated room devoted to the care of such cases only.

Arterial degenerations are seen mainly among the aged, but often cases occur where there appears to be a premature breakdown of the blood vascular system. All forms are seen, and the process not only involves the arteries themselves, but extends into their finer ramifications, thus appearing in the organs of the body, especially the kidneys. The arteries of the brain are frequently involved, as seen by the numerous hemiplegias continually present. Heart disease is very common, but is usually a mild sclerosis of the valves, without symptoms other than those of general arterial breakdown. True valvular disease is rarer than the above form, and is also far more amenable to treatment.

Rheumatism occurs in all its forms, and rheumatoid affections are frequent. The most common form seen is the muscular, next the articular, and then the syphilitic. The gonorrheal type is rare, only two cases appearing on the records of the past year. In the acute articular form we have aspirated the kneejoint in two cases for microorganisms with a negative result. Gout is relatively infrequent. Arthritis deformans is more common; a few cases are always present, showing the disease in all stages, from mild involvement to complete anchylosis. One case is of interest because of the extreme form manifested. The patient, a young man, after a sickness of a little over a year, was admitted to this hospital with an extensive involvement of the lower limbs by this disease. The knees and hips were dislocated and anchylosed. The ankles and tarsal joints were also involved, but to a less extent. The patient was bedridden. The pain on the slightest movement was excruciating. As the patient showed no improvement after three months of treatment, was rapidly becoming emaciated, and as there was no diminution in the associated pains, it was decided to amputate both legs at middle of thigh. This was done, with marked improvement in his general condition, the pains disappearing from the hip joints. He rapidly gained weight and was completely relieved from all troublesome symptoms, the disease passing into a quiescent stage. The differential diagnosis between articular rheumatism and arthritis deformans is one of the most interesting problems encountered here. In addition to the usual differential signs, we always examine the joints of the hands with the X-ray to determine any necrosis or abnormal process in the joint itself. This method has proved of value at times, the radiographs often showing an involvement of the joint by arthritis deformans when the clinical tests were not conclusive.

In the treatment of these affections during the past six months the method of baking the joint in a hot-air apparatus has been employed with most gratifying results. Arthritis deformans shows marked and rapid improvement. The pain is relieved and the movements of the joint increased to an extent not obtained by massage and medicines. Gonorrheal rheumatism also improves rapidly under this method. It is of value in the myalgic form, though here it is of very limited application, as the part affected is so often situated where it is impossible to thoroughly bake it. No case of simple articular rheumatism in the chronic stage was materially benefited by the method.

Diseases of the nervous system comprise another class of cases, of interest mainly from the obscure problems in diagnosis which they present. Tabes dorsalis is the most common, and frequently shows unusual manifestations. Its onset as a rheumatoid affection is of course very common. In two cases the mode of onset was very rare. They were both admitted to the hospital for gastralgia, and a careful examination exhibited the fact that they were suffering from an attack of gastric crisis. In one of the cases the crisis occurs every four to eight weeks and lasts from two to ten days, the patient often sinking so low as to appear moribund. Another rare feature of the disease occurring in one case is the joint condition described by Charcot. In this case the arthropathy affects both knees and is of the hypertrophic form. Both joints are greatly enlarged, almost to twice their original size, the enlargement occurring in both bones entering into the articulation, but being more pronounced in the femur. Another case showed that the process had also involved the lateral columns of the cord, giving rise to the group of symptoms described by Gowers as ataxic paraplegia.

Paralysis agitans and the more moderate degenerations associated with old age are not infrequent. A few cases of insular sclerosis are met with. Myelitis and neuritis are seen among the younger men, as a sequence to various fevers. One case of special interest is that of a man who on admission, nine months ago, had the signs of a chronic myelitis, which, from the progress of the symptoms since admission, is becoming more and more disseminated and tending toward the classical signs of syringomyelia. More or less mental weakness and instability are seen in at least 5 per cent of the recent admissions to the Home, but it appears to be rather a hereditary taint than due to the tropical service, except in a very few cases where it is directly traceable to a sunstroke.

Among the men who have seen service in tropical countries a chronic form of dysentery is frequently seen. The stools are usually of a watery character, containing more or less mucus, but no blood. Intestinal indigestion and flatulence are invariably associated with it. The stools were carefully examined in all cases, but the cause of the disease was found in only three out of twenty-one cases. The amœba dysenteriæ was present in one case. After two months' treatment the organism disappeared, and the patient has had no signs of the disease for about nine months. In two cases the anguillula stercoralis, a form of the strongyloides intestinalis, was present. One of the cases was discharged as recovered after four months residence here, none of the parasites having been found during the last three months. In the other case the parasite is still present two months after admission, but in fewer numbers. The general condition of the patient shows very marked improvement. Cultures were made in nearly all cases, but with negative results. Shiga's bacillus was not obtained from a single case, nor did the bacillus give an agglutinative reaction with the patient's blood serum. In the bacteriological examination of the stools the method was pursued of isolating an organism from the stool which would agglutinate with the patient's serum, but in no case was it successful.

In surgery during the past year there have been 51 operations. Adenitis inguinalis, hemorrhoids, varicose veins, and hernia comprise the majority of the cases. There were 5 cases of hernia operated upon. In 3 cases the Bassini operation was performed, with a perfect recovery and no recurrence. In 2 cases the Halsted operation was performed, in one of which there was a recurrence at the outer point of the incision, but as the patient left the hospital without permission and went at hard work in three weeks, the blame rests with him rather than with the operation. A case of great interest was that of two simultaneous operations on a man 78 years old. The man was suffering with a cancer of the penis and a large right inguinal hernia. A typical Halsted hernia operation was performed; the penis was amputated at the scrotal junction. There has been no recurrence of the hernia and no metastasis from the cancer.

A case of interest on account of its rarity was a cancer of the right breast in a male. The tumor was first noticed seven months before admission, but had given no trouble except slight pain in that breast, shooting to axilla. At the time of admission the growth was about the size of a walnut, lying just above and outside the nipple and not attached to the skin. The nipple was not retracted but was not as freely movable as the left nipple. In the right axilla there were three small glands palpable, one the size of a large hazelnut. The lower part of the pectoralis major muscle and the axillary glands were removed. Patient made an uninterrupted recovery. Microscopical examination showed an adeno-carcinoma of the breast, with metastases to the axillary glands.

Medullary narcosis was employed in four cases, in three of which there was a contraindication to the use of ether or chloroform on account of the condition of the kidneys and lungs. Complete analgesia and partial anasthesia, extending up to the nipple line, were obtained in two cases. In these two, one a hernia and the other

an excision of varicose veins, the operation was painless. In the third case, an excision of a tuberculous sinus from the perineum, only partial analgesia extending up to the umbilical zone was obtained, and there was a little pain experienced during the operation. In the fourth case, amputation of the right thigh, anesthesia and analgesia were obtained over the leg and back of thigh. After injecting a maximum dose of the cocaine solution into the spinal canal and no extension of the analgesia resulting, the method was given up and chloroform resorted to. Of the four cases three were successful. The fourth case was a failure, although the injection was made directly into the spinal canal, as was shown by the escape of spinal fluid through the needle.

Diseases of the ear.—The most common trouble with this organ has been due to accumulation of wax in the external auditory meatus, usually easy of removal by boric-acid syringing, but occasionally inspissated and requiring the use of an instrument. All such cases have been improved and where the drum was not injured have permanently recovered. Otitis media has occurred rarely, not more than 10 cases having presented themselves. None have required paracentesis. Inflation with the Pulitzer bag and postnasal douches have cured all the acute ones, and in several of the chronic character there has been permanent improvement. Eczema of the meatus has been seen three times, easily remedied by salicylic acid ointment. There was one case of polypus of tympanum, but the patient would not submit to an operation. Several cases of concussion leading to deafness of greater or less degree were not benefited by treatment.

Diseases of the nose.—Most of these cases were catarrhal and nearly all chronic. The acute case recovered; the chronic cases were all improved by local and systemic treatment. Nasal polypi were found in five cases, two of which were far advanced, and in both over 20 polypi of various sizes were removed by the cold snare method. In one of these there has been no return of the growth; the other case is still under treatment. Only one case of tuberculosis was seen. The focus was scraped and nitrate of silver applied with good effect. Unfortunately the man left the Home too early to judge the ultimate result. Syphilis has not occurred, except in so far as perforate septum is concerned. Two such cases were noted. Hypertrophic rhinitis is rather more common than the atrophic form. Hay fever is seldom seen, only one case appearing at the clinic. Deflections of the septum are not frequent, but three well-marked cases were seen, and all refused operation.

Diseases of the throat and larynx.—There have been about 10 cases of tonsillitis, usually of the follicular type. One case only developed peritonsilar abscess, and was lanced, with prompt recovery. One case of chronic syphilitic enlargement of the tonsils was seen. This patient was permanently relieved by antisyphilitic treatment. But 1 case of tumor of the larynx occurred. In this case there were 3 small wart-like growths on the true vocal cords, rendering the patient nearly aphonic. There was no pain and no sign of malignancy. Patient refused operation. Tuberculosis of the larynx occurred once. Inhalations of oxygen were tried with but little success. Foci gradually developed in the lungs, and patient was sent to Fort Bayard, N. Mex.

Diseases of the skin.—Simple eczema and eczema due to varicose veins are about equally common. Nearly all the former have recovered completely; the latter group are more refractory, but where an excision of the veins has been allowed in 3 cases the eczema has promptly disappeared in all but 1. Rhus poisoning has been seen in about 20 cases. All recovered. Erysipelas cases are 7 in number. These are usually taken in hospital. The face has been the seat of the process in all. A rather rare condition, erythema bullosum, developed in a patient under treatment for myxedema, who was taking thyroid extract (0.325 grams) three times a day. The eruption was limited to the backs of both hands and the wrists. Stopping the thyroid extract produced a decided change for the better, and the patient recovered in about two weeks. Later the extract was commenced again. In a few days 2 small erythematous patches appeared on either wrist about the styloid process of the ulna, but did not assume any bullous characteristics. Among other skin diseases treated here may be mentioned pediculosis corporis and pubis, tinea versicolor, urticaria, syphilitic eruptions of various kinds (usually macular), seborrhea, herpes zoster, folliculitis staphylogenes, dhobie itch, acne vulgaris, warts, callosities, and 1 case of multiple sarcomatosis where there were 40 or 50 small tumors seen on different parts of the body, but mostly on the face and neck. There was 1 case also of lupus vulgaris, easily cured by curettage.

Diseases of the eye and anomalies of refraction form an interesting feature of the clinical work of the Soldiers' Home. The pathological conditions include nearly all those known to the opthalmologist. In the blind room at the Scott Building there are 4 cases of total blindness and 19 cases of partial blindness from various causes, such as detachment of the retina, atrophy of the optic nerve, cataract, glaucoma,

retinitis pigmentosa, etc. The errors of refractions are numerous, taking into consideration the fact that they are found in a class of men whose vision was considered normal at enlistment. The number whose latent hyperopia has become manifest after 40 and 45 is surprisingly large, a fact that reveals the flaws in our method of examination in spite of its rigid requirements. Prescriptions were written during the year to correct presbyopia and all the anomalies known under refractive errors.

Gunshot wounds.—The remote effects which occurred in gunshot wounds from the old caliber bullet in the pre-antiseptic era, due to retained projectiles, pieces of clothing, etc., and long-standing suppuration associated with necrosis, are virtually absent in the recent cases. There have been 42 cases of gunshot wounds admitted here during the past two years. They have been distributed to the various regions and structures of the body as follows: Head, 4; chest, 4; arm, 3; forearm, 8; hand, 1; thigh, 8; leg, 4; foot, 4; joints, 9; hip, 2; knee, 3; ankle, 3, and elbow, 1. Three of the cases were struck by 2 bullets each, making 45 wounds in all. Four cases showed multiple wounds, in three of which the ball, after passing through the arm, lodged in the body, the position being unknown in 2 cases. In the third case the ball entered the chest wall between the sixth and seventh ribs, in the mid-axillary line, and passed downward, lodging above the hip joint.

The projectile was of the small caliber type in 37 cases, 27 being Mausers, 6 were Krag-Jörgensens, and 4 were unknown. Large-caliber projectiles occurred in 8 cases, 5 being brass-jacketed Remington, 2 were lead bullets of a similar caliber, and 1 was unknown. Five of the cases resulted from bullets deformed by ricochet.

The distance from the firing line of the enemy was unknown in 12 cases, above 500 yards in 21 cases, and under 20 feet in 4 cases. Of the last group of cases mentioned in 2 the projectile passed through cancellous bone and made simple perforation; in another case the projectile struck a little above the ankle, literally blowing the leg off and necessitating immediate amputation.

The remote effects are chiefly pain, soreness or tenderness in the region of the wound, with more or less weakness and some impairment of motion or paralysis, according to the structures involved and the extent of that involvement. Pain and soreness at the site of the wound occurred 25 times; extending peripherally from the wound, with symptoms or signs of a definite neuritis, 7 times; stiffness of the limb and impaired motion at the joint peripheral to the point of injury occurred 21 times. There was total paralysis of the limb peripheral to the lesion in 5 cases and partial paralysis in 9 cases. Deformities were observed in several cases as a result of the paralyses, and in a few cases as a result of nonuse and faulty position.

Major La Garde closes his report with a number of cases of old gunshot injuries, illustrated by some excellent X-ray photographs, which have been sent to the Army Medical Museum.

ARMY MEDICAL MUSEUM.

The total number of specimens in the Army Medical Museum at the end of the fiscal year, June 30, 1901, was 34,988. The following statement shows in detail the additions and changes in the different sections.

Pathological section:	
In museum June 30, 1900	11,877
Received during the year	276
In museum June 30, 1901	12,153
Anatomical section:	
In museum June 30, 1900	1,540
Transferred to other institutions	3
	1,537
Received during the year	15
In museum June 30, 1901	1,552
Section of comparative anatomy:	
In museum June 30, 1900	1,432
In museum June 30, 1901	1,432

Microscopical section:		
In museum June 30, 1900		12,891
In museum June 30, 1901		12,891
Miscellaneous section:		
In museum June 30, 1900		2,494
Received during the year		40
In museum June 30, 1901		2,534
Provisional pathological section:		
In museum June 30, 1900		2,058
Discarded	1	
Transferred to other institutions	731	
		732
In museum June 30, 1901		1,326
Provisional anatomical section:		
In museum June 30, 1900		756
Transferred to other institutions		78
In museum June 30, 1901		678
Photographic series:		
In museum June 30, 1900		2,372
Received during the year		50
In museum June 30, 1901		2,422

RECAPITULATION.

Specimens in museum June 30, 1900		35,420
Discarded and transferred		813
		34,607
Added during the year		381
Specimens in museum June 30, 1901		34,988

The following are some of the more interesting specimens received during the fiscal year:

12143. Double human monster, from San Juan, Porto Rico. Contributed by Capt. J. L. Vina, United States Volunteers.

12120. The Texas screw worm, which carries the Texas cattle-fever germ. Contributed by Capt. J. H. Stone, assistant surgeon, United States Army.

12038–12044, 12005, 12073–12077, 12083, 12084, 12087–12090, 12093–12101, 12106–12109, 12242, 12243, 12246. Specimens from cases of bubonic plague. Obtained in Manila, P. I., by Dr. E. R. Hodge.

12035–12037, 12052–12055, 12061–12064, 12069–12072, 12110–12117. Specimens from cases of leprosy. Obtained in Manila, P. I., by Dr. E. R. Hodge.

12049–12051, 12091, 12250–12253. Specimens from cases of beri-beri. Obtained in Manila, P. I., by Dr. E. R. Hodge.

12247–12249, 12255, 12256. Specimens from cases of chronic amœbic dysentery. Obtained in Manila, P. I., by Dr. E. R. Hodge.

12254, 12257, 12258. Specimens from cases of acute specific dysentery. Obtained in Manila, P. I., by Dr. E. R. Hodge.

12056, 12085, 12086. Spleen and kidney from cases of pernicious malarial fever. Obtained in Manila, P. I., by Dr. E. R. Hodge.

11987–11990. General tuberculosis in a soldier who had contracted dysentery in Manila, P. I. There were perforating tubercular ulcers of ileum and appendix, girdle ulcers of large intestines, tubercular ulcers of urinary bladder, tubercles of lungs, liver, mesenteric glands, and kidneys. The heart was unusually small—but 200 grams. Contributed by Lieut. Col. A. C. Girard, deputy surgeon-general, United States Army.

12206. Plaster cast of face of the late William H. Seward, taken after the attempted assassination, showing facsimile of apparatus applied for fracture of jaw. Contributed by J. A. Bishop, D. D. S., New York, N. Y.

12154. Fragment of skull found lying against the brain forty-four years after shot fracture. No sequelæ of the injury. Contributed by Dr. J. Ford Thompson, Washington, D. C.

12031. Direct and indirect shot fracture of lower jaw of dog. Contributed by Dr. Cecil French, Washington, D. C.

12142, 12020. Two cases of shot fracture of thoracic vertebræ in soldiers. 12142, death occurred thirty hours after injury. Contributed by Dr. A. S. Kennedy, contract surgeon, United States Army. 12020, death occurred almost instantaneously from hemorrhage. Contributed by Lieut. A. E. Truby, assistant surgeon, United States Army.

12027, 12028. Two cases of sarcoma of bone and amputation. 12027, of the ulna of a girl of 14; contributed by Dr. W. M. Gray, Washington, D. C. 12028, of the humerus of a man, age 58; contributed by Dr. A. A. Snyder, Washington, D. C.

12201. Repeated trephining of temporal bone in case of otitis media and sigmoid sinusitis. Death. Contributed by Dr. E. O. Belt, Washington, D. C.

12129. Hemorrhagic separation of layers of dura mater. Contributed by Dr. D. S. Lamb, Washington, D. C.

12155. Mummified brain of Mound Indian of two hundred years ago, showing convolutions. Contributed by Mr. Clarence B. Moore, Philadelphia, Pa.

12016 and 12193. Glioma of brain removed from man, age 28. Two operations. Recovery, with partial use of muscles. Contributed by Dr. D. P. Hickling, Washington, D. C.

12161, 12162. Meningitis and endocarditis following pneumonia, and caused by diplococcus pneumoniæ. Contributed by Dr. D. S. Lamb, Washington, D. C.

12018. Fatal cancer of pleura, secondary to cancer of breast, which had been removed. Woman, age 68. Contributed by Dr. I. H. Lamb, Washington, D. C.

12032, 12033. Fatal pericarditis in a cow, caused by the passing of a piece of wire from stomach to pericardium. Contributed by United States College of Veterinary Surgeons, Washington, D. C.

12017. Rupture of fatty heart of man, age 65. Contributed by Dr. W. E. Whitson, Washington, D. C.

12182, 12183. Hypertrophy of heart and thyroid gland. From a case of general tuberculosis. Contributed by Dr. D. S. Lamb, Washington, D. C.

12013, 12176. Two cases of aneurism of arch of aorta, in which wire was introduced with temporary benefit. 12013, from a man, age 40. Contributed by Dr. W. W. Johnston, Washington, D. C. 12176, a man, age 55. Contributed by Dr. H. A. Robbins, Washington, D. C.

12147. Rupture of spleen in a soldier. Cause unknown. Contributed by Capt. D. C. Howard, assistant surgeon, United States Army.

12003. Plaster cast showing operation for cleft palate. Contributed by Dr. Thomas Fillebrown, Boston, Mass.

12131. Odontoma, weighing 5½ ounces, from jaw of a young steer. Contributed by Dr. John S. Marshall, Chicago, Ill.

12132. Cementoma, weighing 59 ounces, from jaw of a 2-year-old colt. Contributed by Dr. John S. Marshall, Chicago, Ill.

12261. Side of face removed, post mortem, from case of noma. Contributed by Major L. C. Carr, brigade surgeon, United States Volunteers.

11995. Salivary calculi (lime phosphate and organic matter), from abscess near Wharton's duct. Contributed by Capt. A. E. Bradley, assistant surgeon, United States Army.

12139, 12184. Two cases of fatal hemorrhage from stomach. 12139, from a man, age 47; multiple erosions of mucous membrane. Contributed by Dr. M. A. Parsons, Washington, D. C. 12184, from a dog; stomach deeply congested. Contributed by Dr. Cecil French, Washington, D. C.

12034. Gastro-enterostomy in a man, age 45; for cancer of stomach. Death on sixth day. Contributed by Dr. I. S. Stone, Washington, D. C.

11996–12002. Experimental hog cholera. Portions of ileum and colon, showing congestion, thickening, necrosis, and grayish false membrane (mucosa). The hogs were fed, some with bacillus choleræ suis, others with bacillus icteroides (Sanarelli). Contributed by Maj. Walter Reed, surgeon, United States Army, and Contract Surgeon James Carroll, United States Army.

12158. Inguinal hernia in a dog, which occurred just after labor. The sac included both intestine and uterus. Contributed by Dr. Cecil French, Washington, D. C.

12174. Fatal hemorrhage from small intestine in influenza. Contributed by Dr. M. A. Parsons, Washington, D. C.

12183. Fatal purulent peritonitis in intestinal obstruction, the cause of which had disappeared at post mortem. Man, age 45. Contributed by Dr. D. S. Lamb, Washington, D. C.

12011, 12173, 12177. Three cases of cancer of head of pancreas. 12011, from a man, age 49. Contributed by Dr. D. G. Lewis, Washington, D. C. 12173, man, age 73. Contributed by Dr. Amelia Erbach. 12177, man, age 65. Contributed by Dr. D. S. Lamb, Washington, D. C.

11991, 11992. Gas bacillus dilatation of liver. Contributed by Dr. James Carroll, contract surgeon, United States Army.

12148. Liver of yellow fever. Contributed by Dr. James Carroll, contract surgeon, United States Army.

12078. Hydatid cysts of liver. Contributed by Dr. E. R. Hodge, Washington, D. C.

12105. Subperitoneal hemorrhage of liver in typhoid fever. Contributed by Dr. E. R. Hodge, Washington, D. C.

12124. Hydronephrosis in a new-born child. Contributed by Dr. T. C. Smith, Washington, D. C.

12198. Successful nephrectomy, for renal tuberculosis. Man, age 20. Contributed by Dr. E. J. Whitehead, Columbiana, Ohio.

12014. Miliary tuberculosis of kidney in boy, age 3 years. Contributed by Dr. J. Ford Thompson, Washington, D. C.

12200. Prostatectomy; removal of 165 grams of the gland. Man, age 56. Death on fifth day. Contributed by Dr. A. A. Snyder, Washington, D. C.

12137, 12138. Abscess of Fallopian tube and ovary, followed by fatal purulent pericarditis. Woman, age 19. Contributed by Dr. D. S. Lamb, Washington, D. C.

12019. Human ovum of 11 weeks, which was conceived after bi-lateral ligation of Fallopian tubes. Contributed by Dr. W. A. Frankland, Washington, D. C.

12135. Placenta velamentosa. Contributed by Dr. V. E. Watkins, contract surgeon, United States Army.

12241. Fibro-sarcoma removed from abdominal wall of soldier. Contributed by Capt. H. M. Hallock, assistant surgeon, United States Army.

12007–12008. Two specimens of keratolysis. 12007, from man, age 50, who had been a soldier eleven years and was discharged because of the disease. Had had it since early infancy. Contributed by Dr. R. M. Stone, Omaha, Nebr. 12008, from a woman, age 60, who had had the disease seventeen years. Contributed by Dr. E. W. Reisinger, Washington, D. C.

12157. Remarkable cuticular hypertrophy of hoof of horse, following laminitis. Contributed by United States College of Veterinary Surgeons, Washington, D. C.

12207–12240. Series of models showing diseases of skin, mainly the rarer forms. Prepared by J. Baretta, Paris.

LIBRARY OF THE SURGEON-GENERAL'S OFFICE.

The following table shows the additions made to the library during the fiscal year 1900–1901:

Description.	On hand June 30, 1900.	Added during fiscal year.	Total, June 30, 1901.
	Volumes.	*Volumes.*	*Volumes.*
Medical journals	40,418	1,463	41,881
Medical transactions	6,292	367	6,659
Bound theses	2,054	80	2,134
Bound pamphlets	2,754	51	2,805
Other medical books	84,377	2,683	87,060
Total	135,895	4,644	140,539
Medical theses	62,138	1,756	63,894
Medical pamphlets	166,379	6,455	172,834
Total	228,517	8,211	236,728

Of the total number of theses on hand June 30, 1900, there were 1,093, bound in 80 volumes, and 275 pamphlets, bound in 43 volumes, during the year.

There were presented to the library during the year 483 books and 9,291 pamphlets and journals.

Volume VI, second series, of the Index-Catalogue includes the letters G and H from G to Hernette, and forms a volume of 1,051 pages. It will be ready for distribution at the usual time. The appropriation for Volume VII, second series, having been made, the manuscript is in course of preparation for the printer.

MEDICAL OFFICERS.

UNITED STATES ARMY.

The total number of regular medical officers allowed by law under the Army reorganization act (approved February 2, 1901) is 321; number in service June 30, 1901, 245; number of vacancies on that date, 76.

Appointments.—Fifty-seven appointments as first lieutenants and assistant surgeons were made during the year with one appointment as captain and assistant surgeon, the incumbent in this special case having been retired on the date of his appointment.

Promotions.—Five officers were promoted from lieutenant-colonel and deputy surgeon-general to colonel and assistant surgeon-general; 8 from major and surgeon to lieutenant-colonel and deputy surgeon-general; 20 from captain and assistant surgeon to major and surgeon; and 5 from first lieutenant and assistant surgeon to captain and assistant surgeon.

Retirements.—Three colonels and assistant surgeons-general and 2 captains and assistant surgeons (retired with the rank of major).

Deaths.—One colonel and assistant surgeon-general, 2 majors and surgeons, and 1 first lieutenant and assistant surgeon.

Resignation.—One first lieutenant and assistant surgeon.

The appointments were made on the recommendation of examining boards in session in San Juan, P. R.; Manila, P. I.; Washington, D. C.; and San Francisco, Cal.

Summary of work of the Army medical board convened in San Juan, P. R., on August 6, 1900.

Number of candidates invited to appear	7
Approved	2
Physically disqualified	2
Rejected	1
Withdrew	2

Summary of work of the Army medical board convened in Manila, P. I., on April 16, 1900.

Number of candidates invited to appear	154
Declined to appear	1
Number of candidates examined	153
Approved	[1] 46
Physically disqualified	33
Rejected	29
Withdrew	45

[1] Includes 16 mentioned in last annual report, 1 of whom died before appointment.

Summary of work of the Army medical board convened in Washington, D. C., on February 11, 1901.

Number of candidates invited to appear	191
Declined to appear	19
Failed to appear	45
Requirements unfulfilled	1
Number of candidates examined	126
Approved	21
Physically disqualified	45
Rejected	51
Withdrew	9

Summary of work of the Army medical board convened in San Francisco, Cal., on February 11, 1901.

Number of candidates invited to appear	19
Declined to appear	5
Failed to appear	5
Number of candidates examined	9
Approved	4
Physically disqualified	1
Withdrew	4

It is gratifying to note that although the percentage of candidates approved by the boards recently in session is 24.84 as compared with 19.23 approved by the boards in session during the ten years 1889–1898, inclusive, there has been no lowering of the standard of admission. So many of the recent candidates were young men who had proved their capabilities, physical and professional, by one or more years of active service as volunteer or contract surgeons that the ratio of successful candidates was necessarily higher among them than among the young medical graduates who came before the earlier boards. Few of those who appeared before the board in session in Washington, D. C., had previous service, and among them the ratio of approved candidates was only 16.67 per cent as compared with 19.23 per cent during the decade cited.

The following table shows the comparative work of these boards:

Statistics of examinations by Army medical boards held during the ten years from January 1, 1889, to December 31, 1898, compared with those held during 1900 and 1901.

[NOTE.—There were no examinations during 1899.]

Boards.	Invited.	Declined to appear.	Failed to appear.	Requirement unfulfilled.	Number examined.	Approved.	
						Number.	Per cent.
1889–1898.							
Total, 10 years	639	24	121	.....	494	95	19.23
1900.							
Havana, Cuba	16	.....	1	.....	15	4	26.67
San Juan, P. R.	7	.....	.....	.....	7	2	28.57
1900–1901.							
Manila, P. I.	154	1	.....	.....	153	46	30.06
1901.							
Washington, D. C.	191	19	45	1	126	21	16.67
San Francisco, Cal.	19	5	5	.....	9	4	44.44
Total, 1900–1901	387	25	51	1	310	77	24.84

Statistics of examinations by Army medical boards, etc.—Continued.

Boards.	Physically disqualified.		Rejected. (Other causes than physical.)		Withdrew.		Ratio approved to—	
	Number.	Per cent.	Number.	Per cent.	Number.	Per cent.	Physically disqualified.	Rejected and withdrew.
1889–1898.								
Total, 10 years	127	25.71	198	40.08	74	14.98	1 : 1.34	1 : 2.86
1900.								
Havana, Cuba	.....	.....	10	66.67	1	6.67	1 : 0	1 : 2.75
San Juan, P. R.	2	28.57	1	14.29	2	28.57	1 : 1	1 : 1.50
1900–1901.								
Manila, P. I.	33	21.57	29	18.96	45	29.41	1 : 0.71	1 : 1.61
1901.								
Washington, D. C.	45	35.71	51	40.48	9	7.14	1 : 2.14	1 : 2.86
San Francisco, Cal.	1	11.11	.....	.....	4	44.44	1 : 0.25	1 : 1
Total, 1900–1901	81	26.13	91	29.35	61	19.68	1 : 1.05	1 : 1.97

MEDICAL OFFICERS OF VOLUNTEERS.

All medical officers of the volunteer staff appointed under the Act of Congress approved March 2, 1899, were mustered out of service on June 30, 1901, and all regimental surgeons and assistant surgeons were mustered out on the same date, except the medical officers of the Forty-seventh Infantry, United States Volunteers, who were mustered out on July 2, 1901.

Under the Act approved February 2, 1901, there were appointed for service in the Division of the Philippines 50 surgeons with the rank of major (of whom 8 are captains and assistant surgeons, United States Army), and 150 assistant surgeons with the rank of captain. One major and surgeon and 2 first lieutenants and assistant surgeons died during the year.

CONTRACT SURGEONS, UNITED STATES ARMY.

There were in service June 30, 1900, 462 contract surgeons. During the year ended June 30, 1901, contracts were made with 265 physicians; 333 contracts were annulled and 7 terminated by death, leaving in service June 30, 1901, 387 under contract. Of this number 106 were on duty in the United States, 17 on transports, 14 in Cuba, and 250 in the Philippine Islands.

The following tabulation shows the number of contracts with physicians made from April 17, 1898, to December 31, 1900, classified by length of service:

	Out of service.	In service.	Total.
Served under one month	36	4	40
Served one to six months	342	132	474
Served six to twelve months	143	99	242
Served one to two years	119	115	234
Served over two years	27	179	206
Total	667	529	1,196

Total number serving in 1898	771
Daily average serving in 1898	344
Total number serving in 1899	670
Daily average serving in 1899	412
Total number serving in 1900	658
Daily average serving in 1900	482

Average service of the 667 out of service, seven months, twelve days.
Average service of the 529 in service, one year, four months, fourteen days.
Average service of the 1,196 contract surgeons, eleven months, twelve days.

The seven who died during the fiscal year 1900–1901 were: Charles Roemmelt, July 20, 1900, malarial fever; Frederick W. Hulseberg, August 1, 1900, killed by insurgents; Jesse W. Lazear, September 25, 1900, yellow fever; Charles A. Ross, February 2, 1901, killed by insurgents; James A Rabbett, February 20, 1901, eruptive fever; Sherman A. Yule, March 4, 1901, nephritis; Charles St. John, May 22, 1901, killed by insurgents.

CONTRACT DENTAL SURGEONS.

The corps of 30 contract dental surgeons authorized by the Act of Congress approved February 2, 1901, is in progress of formation. Up to June 30, 1901, only 17 had been employed, and 3 of these were the supervising dental surgeons who constituted the examining board for this service. Of the 14 who passed the examining board and were given contracts for three years, 1 was assigned to the Department of Cuba, 11 to the division of the Philippines, and 2 were stationed at posts in the United States.

ARMY MEDICAL SCHOOL.

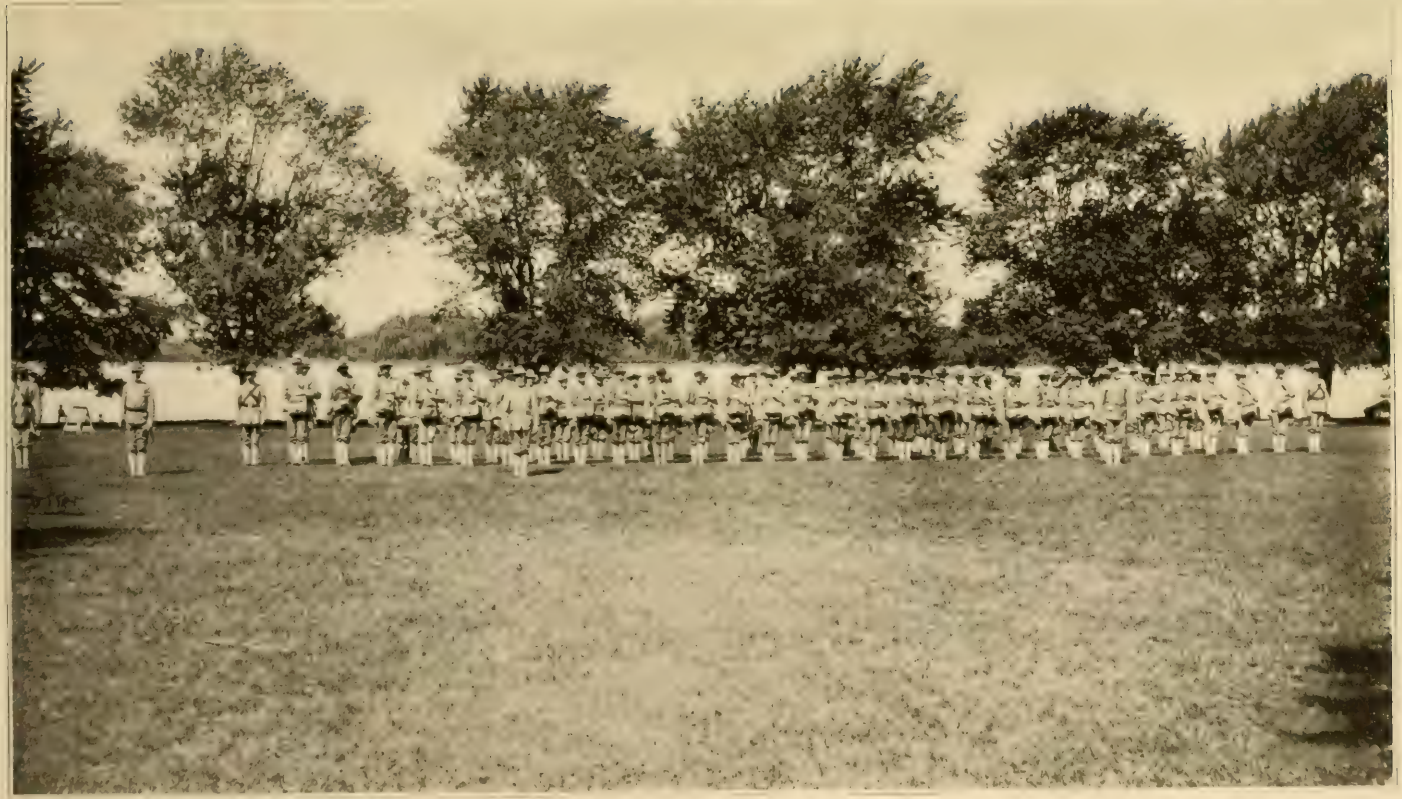
Existing conditions in the army medical department rendered it impracticable to carry out the usual school programme during the session of 1900–1901.

THE HOSPITAL CORPS.

On June 30, 1900, the Hospital Corps consisted of 167 hospital stewards, 381 acting hospital stewards, and 3,543 privates, a total of 4,091 enlisted men. During the fiscal year ending June 30, 1901, the corps gained by enlistment and reenlistment 844, by transfer from the line 221, by surrender from desertion 11, and by apprehension from desertion 6, a total of 1,082, and during the same period it lost 837 men, as follows: 417 by expiration of term of service, 137 by discharge by order, 47 by sentence of general court-martial, 97 by discharge on surgeon's certificate of disability, 16 by retirement, 16 by retransfer to the line, 63 by desertion, 2 killed in action, 36 by death due to disease, 3 by drowning, and 3 by suicide, leaving in service June 30, 1901, 246 hospital stewards, 388 acting hospital stewards, and 3,702 privates, a total of 4,336.

Hospital stewards.—The act of Congress approved May 26, 1900 (General Orders, No. 76, Headquarters of the Army, June 1, 1900), increased the number of hospital stewards by 100, making a total allowance of 200. There being an excess of 67 hospital stewards in service (remaining from those authorized during the Spanish-American war), only 33 vacancies required to be filled. An examination was held during August, 1900, for which 40 applications were received. Of this number 3 declined examination, 1 withdrew, 2 were not recommended by the examining board, 14 failed to pass, and 20 were found qualified and appointed.

To replace the loss of hospital stewards that would be occasioned by the muster out of the volunteer regiments, Congress (Act approved February 2, 1901) allowed an additional 100 hospital stewards (making a total of 300), "provided that men who have served as hospital stew-



COMPANY OF INSTRUCTION, HOSPITAL CORPS, GENERAL HOSPITAL, WASHINGTON BARRACKS, D. C., 1901

ards of volunteer regiments or acted in that capacity during and since the Spanish-American war for more than six months, may be appointed hospital stewards in the Regular Army; provided, further, that all men so appointed shall be of good moral character and shall have passed a satisfactory mental and physical examination." Fifty of the new appointments were allotted to the Division of the Philippines, and on February 16, 1901, the chief surgeon there was directed by cable to examine and recommend hospital stewards of volunteers and acting hospital stewards, Hospital Corps, United States Army, for promotion to the grade of hospital steward in the regular establishment. Upon his recommendation 27 candidates, who there successfully passed the required examination, were appointed up to June 30, 1901. To fill the remaining vacancies examinations were held in the United States, Cuba, and Porto Rico in March, 1901. Of the 60 applicants for these examinations, 5 declined, 2 failed to report, 13 were not recommended by the board, 9 failed to pass, 31 were passed; 30 were appointed, and 1 who had passed was discharged by expiration of service, not availing himself of this opportunity for promotion.

Acting hospital stewards.—Heretofore the examinations of privates of the corps for promotion to the grade of acting hospital steward were authorized directly by the Surgeon-General in each case. This method consumed considerable time and frequently caused delay in filling existing vacancies. To avoid this, department authorities were authorized to make these details, after examination as required by the regulations, without first requesting authority from the Surgeon-General, provided the allowance of acting hospital stewards and privates for each command be not exceeded, except by special authority of the Secretary of War. This has relieved this office of a considerable amount of work which is now quite as well done and with greater advantage to the service, in the offices of the different chief surgeons at the headquarters of the military departments. Questions for these examinations are prepared by the chief surgeon and copies thereof, as well as of the report of the examining board, are furnished the Surgeon-General in each case.

Recruitment.—Owing to an increased demand for men of the Hospital Corps for duty in the Division of the Philippines and with the China relief expedition, general recruiting officers and attending surgeons stationed at important points were granted authority, in July, 1900, to enlist desirable men for the corps, especially for foreign service, without reference to this office. The number required having been obtained, this general authority was withdrawn about September 10, 1900, and thereafter authority for enlistments was granted only in cases where men had previous service in the Army or were exceptionally desirable by reason of education, character, and physique.

To meet the current requirements of the corps, recruiting was resumed in the early part of January, 1901, and by the end of March a sufficient number of men had been enlisted for this purpose, when general recruitment was again suspended, and remains so up to the present time. Recruiting officers were cautioned to accept none but desirable men for the Hospital Corps, particular stress being laid upon the necessity for good education and physique, and waiving only slight deviations from the physical standard for vision in cases of young applicants in whom refractive errors could be entirely corrected by glasses. As a whole, the recruiting service for the corps has been

satisfactory, a very small percentage of recruits being found unfit for service after a trial of several months. All men enlisted for the Hospital Corps at rendezvous east of the Mississippi River were sent to the company of instruction, Hospital Corps, Washington Barracks, and others to the school at Fort McDowell, Angel Island, Cal. In addition to this source of supply, chief surgeons were authorized (letter of the Surgeon-General dated December 19, 1900) to enlist and reenlist men up to the regulation allowance of their departments without reference to this office. Up to the present but a small proportion of enlistments has been made in the departments, but it is hoped that presently matters will so shape themselves that the home departments will be able to take care of themselves, leaving to this office only the responsibility for the supply of commands outside the continent.

Distribution.—The number of posts and stations requiring the service of men of the Hospital Corps was about 146 in the United States, Cuba, and Porto Rico, and about 438 in the Division of the Philippines—the number varying more or less at short intervals; a total of about 568. In addition thereto, 7 arsenals and 4 general hospitals in the United States, 1 in the Hawaiian Islands, 1 in Japan (Nagasaki), and the hospitals in China, together with the transport service, had to be supplied with the necessary Hospital Corps personnel. To supply these stations and the great number of small field commands in the Division of the Philippines, the number of men of the Hospital Corps had to be somewhat increased during the fiscal year. A corresponding reduction is now gradually going on which will soon bring the number of men in the corps to the lowest percentage required by the distribution of the strength of the Army, now fixed at about 77,287, for which number it is estimated that 300 hospital stewards, 343 acting hospital stewards, and 2,571 privates; total, 3,214 will be sufficient. If, however, the Hospital Corps is expected to meet the sanitary requirements of the Porto Rican Provisional Regiment and 13,000 native troops authorized in the Philippines, its total strength can not be much less than 3,800.

The number of men of the Hospital Corps actually required in the different sanitary organizations has never been definitely laid down in regulations. Paragraphs 1409 and 1410, Army Regulations 1895, prescribed the number allowed to posts, which was based upon the number of companies constituting the garrison, rather than their strength, which is an uncertain quantity. In paragraphs 1605 and 1606, Army Regulations 1901, the allowance is based upon actual strength, and the proportion of noncommissioned officers is definitely established. It must be understood, however, that this applies only to the army in garrison. In active service the requirements will probably not be less than 5 per cent of the fighting effective.

The number and distribution of detachments of the Corps in the last quarter of the fiscal year were about as follows:

United States	118	Transports	19
Porto Rico	3	China	1
Alaska	7	Philippines	294
Cuba	18		
Hawaiian Islands	1	Total	461

Uniform and equipment.—In compliance with General Orders, No. 19, February 21, 1901, from the Headquarters of the Army, the insignia of the Hospital Corps was changed to conform to that of the Med-

ical Department, following the custom obtaining in all other branches of the service, where the insignia worn by the officer and enlisted soldier are identical in form. The arm brassards with the red cross remaining on hand will be available in any war with a signatory of the Geneva Convention for use in the field by all who may be neutralized by the terms of that convention. No change in equipment was made during the year, but to facilitate the transfer of fully-equipped men from one command to another, particularly in active service, paragraph 1604, Army Regulations, was promulgated. This paragraph prescribes the equipment and the method of transferring the accountability for it in changing stations. It is believed that this is a great improvement upon the regulation heretofore obtaining, which during the Spanish-American war was proved to be impossible to enforce.

In this connection, I would respectfully invite attention to the necessity for some change in the regulations governing descriptive lists, particularly in their application to the Hospital Corps. The very elastic organization of this body and the loose local attachment of its members, which are particularly apparent in active service, render necessary the adoption of some rule which will assure a reasonably intimate companionship between the man and his descriptive list.

During the year unusual attention has been given to the instruction of the men of the Hospital Corps, it being realized that a considerable part of the success of the department depends upon this important organization. Of the nearly 5,000 men now constituting the corps, a very large part entered the service since 1897, and but few of them, from the necessities of the situation, could receive the careful training given the sanitary soldier in our Army before the Spanish-American war. To be sure, they were no worse off in this respect than the men of the other branches of the service, but their individual responsibility is so much greater that lack of training became more apparent.

In a letter dated December 19, 1900, I indicated to the chief surgeons my desire to make them responsible, so far as practicable, for the recruitment, discipline, and instruction of the Hospital Corps in their respective departments, a plan which had recently been carried out with excellent results in the departments without the United States. I also directed that the provisions of paragraph 1413, Army Regulations 1895, as amended (par. 1609, A. R. 1901), should be strictly enforced and that a suitable course of instruction be prescribed covering five hours weekly, of which a report in detail should be submitted with the monthly return of the Hospital Corps.

During the year detachments of instruction were reestablished at the following-named stations: Fort Columbus, New York Harbor; Fort Sheridan, Ill.; Fort Snelling, Minn.; Fort Leavenworth, Kans.; Fort Sam Houston, Tex.; Fort Logan, Colo.; Vancouver Barracks, Wash.

Prior to April, 1898, detachments of instruction were maintained at some of the principal posts in the West. The withdrawal of troops during the Spanish-American War caused not only a temporary cessation of instruction, but in most cases a discontinuance of these detachments. In the fall of 1900, surgeons serving at the above-named posts were notified to reestablish at once these detachments and the required course of instruction. To put the Department of the East on an equal footing with those of the West, six additional privates were allowed in December, 1900, to Fort Columbus for the pur-

pose of instruction and to meet any emergencies in that department. The course of instruction in these detachments was prescribed by the chief surgeons who were especially charged with their supervision. No special reports regarding them have yet been received.

Schools of instruction.—Schools of instruction were maintained at the Army General Hospital, Washington Barracks, D. C.; at Fort McDowell, Cal. (Angel Island), and at Hospital No. 3, Manila, P. I. Most valuable work has been done in these organizations, which are now all running on a high plane of efficiency. As heretofore stated, owing to the demands of the service abroad, especially the sudden outbreak in China, not only were the companies of instruction in the United States depleted, but even the post detachments were temporarily reduced to the lowest practicable limits. The company of instruction at Washington Barracks, under command of Capt. E. L. Munson, assistant surgeon, United States Army, had thereafter but a nominal existence until recruiting was again begun. On March 16, when Maj. F. P. Reynolds, surgeon, United States Volunteers (assistant surgeon, United States Army), assumed command, the strength of the company had reached 183. The curriculum and interior economy at this school are set forth in the following report by Major Reynolds, under date August 29, 1901:

I. LENGTH OF TIME THE COURSE OF INSTRUCTION IN THE SCHOOL SHOULD CONTINUE.

The course of instruction in this company has been one of three months, at the end of which time the men were sent to San Francisco for foreign service. Of late the demand for men has been less, so that transfer at the end of the course has not been necessary in all cases. Advantage was taken of this to establish a fourth month or graduate class, and also to supply the hospitals with a liberal allowance of men who had been through the course of instruction.

For the last detachment ordered for foreign service it was therefore possible to select one-third of the men from the detachment on duty in the hospital and who had been under instruction for one month or more, and the remainder from the "graduate" class in the company.

It is my opinion that the course of instruction in a company of instruction should extend over at least four months. The instruction of the fourth month should be largely practical in character to firmly fix in the mind the theoretical instruction of the previous months by making a practical application of it.

There has been six hours' daily instruction (exclusive of Saturday and Sunday) during the summer months, about equally divided between outdoor and indoor work. During the remainder of the year the time will be reduced to five and one-half hours by reducing the amount of outside instruction. There has been no indication that these hours are too long or that better results would be obtained by a shorter day. With the exception of the occasional suspension or reduction of outside work during stormy or excessively hot weather or for field sports, this outline has been followed for the past six months. In stormy weather the hours for outside drill have been devoted to study.

II. CHARACTER OF INSTRUCTION.

The following outline of the present course of instruction in this company is submitted as embodying my ideas on the subject:

SCHEDULE OF INSTRUCTION.

First three months:

Setting-up drill, all classes, daily, one-half hour.
Company drill, all classes, daily, one-half hour.
Bearer drill and field work, daily, first and second months, 1¾ hours; third month, 1 hour.
Anatomy and physiology, daily, first month, 1 hour.
Nursing and ward management, daily, 1 hour, second month.
Bandaging, daily, first month, 1 hour.

REGIMENTAL FIELD HOSPITAL. FIELD EXERCISES, COMPANY OF INSTRUCTION, GENERAL HOSPITAL, WASHINGTON BARRACKS, D. C., 1901.

First aid, daily, second and third months, 1 hour.
Diet cooking, daily, second month, 1 hour.
Materia medica and pharmacy, daily, third month, 2 hours.
Clerical work, twice a week, third month, 1 hour.
Care of animals, twice a week, third month, 1 hour.
Elementary hygiene, daily, first month, 1 hour.

Fourth month:

Setting-up drill, daily, one-half hour.
Company drill, daily, one-half hour.
Bearer drill, daily, 1 hour.
Care of animals, twice a week, 1 hour.
Materia medica and pharmacy, daily, 1 hour.
Clerical work, daily, 1 hour.

Setting-up drill or calisthenics, as given here, consists of the usual setting-up exercises of the Infantry Drill Regulations, with the addition of a number of exercises taken from the Manual of Calisthenic Exercises devised by Lieutenant Koehler, master of the sword, at the United States Military Academy. Attended by all classes.

Company drill is attended by all classes and includes definitions, general principles, school of the soldier, the squad, and school of the company, including movements by platoons as laid down in Infantry Drill Regulations. Manual of arms, firings, and bayonet exercises are of course not included.

Bearer drill includes everthing laid down in the Drill Regulations for the Hospital Corps. The course is graded and covers three months.

Bearer drill and field work.—All classes. First month: Drill Regulations, paragraphs 50–113. Recitations on these paragraphs. Duty of each member of the squad. Drill with unloaded litter. Drill with loaded litter.

Second month: Paragraphs 113–165. Recitations on these paragraphs. Loaded litter over obstacles. Loaded litter upstairs. Loaded litter downstairs. To load with reduced numbers. Improvisation of litters. To remove wounded without litters. To place patient on horseback. The use of the travois. Ambulance drill. To prepare and load ordinary wagons.

Third month: Tent drill and packing. Shelter tent. Clothing roll. First-aid work in the field.

The course of instruction of each month has been concluded with public field exercises, the preparation for which has occupied the drill hours of the first class during the last week of the course.

The concluding feature has been an exhibition of some work of the Medical Department in active service; a regimental field hospital has been established and all departments completely organized for work, including the preparation of light diets; the work of a brigade section of an ambulance company has been shown by the establishment and operation of dressing and ambulance stations.

These exercises have increased the men's interest in their work to a marked degree, and have been beneficial in many other ways. On each occasion there has been a considerable attendance of officers and their families and civilians from the city.

FIELD GRADUATING EXERCISES OF THE FIRST CLASS, APRIL 27, 1901.

1. Company drill, platoon formations, 10 minutes.
2. Litter drill, all classes, unloaded litter, 10 minutes.
3. Litter drill by classes, 20 minutes. First class: First aid in the field, search for wounded, method of exposing wounds, applying first-aid dressings, application of extemporized splints, transporting patient by litter and ambulance to dressing station. Second class: Litter drill with loaded litter; squads acting independently—upstairs, downstairs, obstacles; removing wounded without litters. Third class: Litter drill with unloaded litter (without slings); commands; change bearers; posts; loading patient on litter, and unloading.
4. Exhibition drill, manual of unloaded litter, by detachment for Pan-American Exposition.
5. Exhibition tent pitching, detachment for Pan-American Exposition.

FIELD EXERCISES, MAY 29, 1901.

1. Company exercises: (*a*) Calisthenic class (A. H. S. Howe, instructor). (*b*) Company drill.
2. Bearer drill by classes: (*a*) (First class:) Shelter-tent pitching. (*b*) (Second class:) Drill with loaded litter (A. H. S. Howe, instructor). (*c*) (Third class:) Exercises with triangular bandage (A. H. S. Eiseman, instructor.)

3. Practical field work by first and second classes—showing the work at the front by a brigade section of an ambulance company: (*a*) Establishment of a dressing station. (*b*) Establishment of an ambulance station. (*c*) The work on the firing line: First aid in the field, removing wounded by litter, on horseback, by blanket litter, and without litter by one or more bearers.

FIELD EXERCISES JULY 2, 1901.

1. Calisthenic class.
2. Company drill.
3. Bearer drill by second class.
4. Exercises with the triangular bandage by the third class.
5. Practical field work by the first class: (*a*) Establishment and organization of a regimental hospital. (*b*) First aid in the field.

Elementary anatomy, physiology, and hygiene are taught during the first month by demonstrations, lectures, and recitations. A skeleton and an excellent manikin are used.

Bandaging is also taught during the first month by one hour's practical work daily.

ANATOMY AND PHYSIOLOGY (FIRST MONTH).

[Text-books: Smart's Handbook for the Hospital Corps; Doty's Prompt Aid to the Injured.]

1, 2, 3. Anatomy of the skeleton. 4. The muscular system. 5. Review. 6. The nervous system. 7, 8, 9. The circulation of the blood. 10. Review. 11, 12. The respiratory system. 13, 14. The alimentary system. 15. Review. 16. Organs of excretion. 17. Organs of reproduction. 18. Organs of special sense. 19. Review. 20. General review.

BANDAGING (FIRST MONTH).

1. Figure of eight, gauntlet. 2. Spica of the thumb, spiral reverse of the upper extremities. 3. Spica of shoulder, single. 4. Spica of shoulder, double. 5. Spica of the foot, covering the heel. 6. Spiral reverse and figure of eight, lower extremity. 7. Spica of groin, single. 8. Spica of groin, double. 9. Barton's head bandage. 10. Velpeau bandage.

ELEMENTARY HYGIENE (FIRST MONTH).

1. Disinfection and contagious diseases (Smart, pars. 534–560; Doty, pars. 91–109). 2. Hygiene (Doty, pars. 207–222). 3. Field service (Smart, pars. 63–110; Soldier's Handbook, pars. 83–89).

DIET COOKING.

The course in diet cooking is given by Miss Elizabeth Stack, a professional nurse and dietist. Each member of the class during the month prepares the various articles of light diet as laid down in the Manual of Emergency Diet, devised by Captain Munson, assistant surgeon, United States Army.

The various ways of utilizing the articles of the travel, field, and garrison rations for the use of the sick form an important feature of this course.

NURSING AND WARD MANAGEMENT (SECOND MONTH).

[Text-book, Clara Week's Nursing.]

Nursing and ward management are also taught by Miss Stack.

1. Care and management of ward. 2. Beds and bed making. 3. Admission of patient, care of effects. 4. Observation of symptoms. 5. Thermometers, charting of temperature. 6. Observation and recording of pulse and respiration. 7. Baths and bathing. 8. Preparation of enemata and administration. 9. Disinfectants, care of utensils, sputa cups, bedpans, urinals, etc. 10. Medicine and its administration. 11. Preparation of patient for operation. 12. Treatment of inflammation, medical and surgical. 13. Asepsis, antisepsis. 14. Ward dressings, surgical and medical. 15. Ward emergencies. 16. Nursing in typhoid fever. 17. Nursing in contagious diseases. 18. Nursing in convalescence. 19. Dissolution, care of body, autopsy. 20. Review.

FIRST AID.

First aid is taught by lectures and recitations during the second month and by demonstrations and practical exercises during the third month.

First class: 1. Medical emergencies—Symptoms, diagnosis, general rules for emer-

gencies, common causes of unconsciousness, poisons. 2. Demonstrations and practical instruction in the treatment of sunstroke, burns, heat exhaustion, severe hemorrhage, smothering, foreign bodies, shock, wounds of all regions, fracture dressing, use of packet. 3. The use of the field equipment—Pouches, cases, chests, furniture. 4. Practical field work.

Second class: Recitations—Asepsis and antisepsis, shock, bruises, burns, freezing, hemorrhage, the first-aid packet, wounds and their treatment, sprains, extraction of teeth, fractures, dislocations.

Materia medica and pharmacy (third and fourth months).—Instruction in this course is given in a lecture room in which a complete dispensary has been fitted up. Some time is spent in teaching the use of apparatus, the appearance of crude drugs, salts, and official preparations.

In each class of about 25 men there have been 3 or 4 who, because of deficient education or intelligence, were unable to profit by the instruction given in this course. Such men are usually dropped at the end of the first week. A few others find the subject difficult to understand, become discouraged, and fall behind. They are encouraged to do the best they can, and they usually finish the course with a proficient mark or approximating proficiency.

The course is a thorough one, and with a few months' practical experience in a hospital dispensary aims to prepare on the subject a candidate for promotion to the grade of acting hospital steward.

The man who in other respects is qualified for the latter grade has no difficulty in comprehending the work of the course or in standing well in the examination at its completion.

MATERIA MEDICA (THIRD MONTH).

The instructor is a graduate pharmacist of considerable experience.

First week: 1. The medical supply table. 2. Classification of drugs on the medical supply table. 3, 4. Definitions. 5. Review.

Second week: 1. Oxygen, hydrogen, and water. 2. Acids (mineral). 3. Acids (organic). 4. Alkalies (potassium, sodium, lithium, ammonium). 5. Review.

Third week: 1. Magnesium, zinc, and iron. 2. Lead, copper, and silver. 3. Mercury. 4. Antimony, arsenic, and bismuth. 5. Review.

Fourth week: 1. Alkaloids. 2. Volatile oils. 3. Fixed oils and fats. 4. Animal products. 5. General review.

PHARMACY (THIRD MONTH).

First week: 1, 2. Metrology. 3, 4. Operations requiring heat. 5. Review.

Second week: 1, 2. Operations not requiring heat. 3. The United States Pharmacopœia, official preparations. 4. Aqueous solutions. 5. Review.

Third week: 1. Alcoholic solutions. 2. Percolation. 3. Oleaginous solutions. 4. Ethereal solutions. 5. Review.

Fourth week: 1, 2, 3. Solid preparations. 4. Formulæ. 5. Review.

PRACTICAL COURSE IN MATERIA MEDICA AND PHARMACY (FOURTH MONTH).

First week: 1. Care of a United States hospital dispensary. 2. Use of weights and measures. 3. Solution, simple, chemical, gaseous. 4. Operations requiring heat. 5. Review.

Second week: 1. Operations not requiring heat. 2. Percolation. 3, 4. Official liquid preparations. 5. Review.

Third week: 1, 2, 3, 4. Official liquid preparations. 5. Review.

Fourth week: 1. The prescription. 2. Incompatibility of drugs. 3, 4. Dispensing. 5. Review.

COURSE OF INSTRUCTION IN CLERICAL WORK.

Clerical work is taught by lectures, recitations, and the actual preparation of the different reports, returns, and records required to be made and kept at a post or field hospital. The course extends throught the third and fourth months.

The nature, objects, and methods of preparation of the following reports are explained to the class and copies of the reports are examined and criticised.

Daily reports.—1. Morning report. 2. Morning report of Hospital Corps detachment. 3. Detachment sick report. 4. Posting of register of patients. 5. Correspondence and current work.

Weekly reports.—1. Weekly report of detachment.

Trimonthly return.—1. Ration return of detachment and patients subsisted on the ration.

Monthly reports.—1. Report of completed cases. 2. Return of Hospital Corps and means of transportation. 3. Report of physical examination of recruits. 4. Statement hospital-fund account. 5. Statement ice-fund account (at posts having ice factory). 6. Personal report of medical officers. 7. Personal report and post-office addresses of staff officers (G. O., 108, 1898). 8. Sanitary report. 9. Report of repairs of hospitals and hospital stewards' quarters. 10. Ration return for those rationed separately, requisition for fuel, forage, etc. 11. Pay rolls.

Bimonthly reports.—1. Muster rolls. 2. (Report of changes in detachment for preceding two months, rendered on the last day of each month the muster roll is not made out.)

Quarterly reports.—1. Ordnance return. 2. Return of clothing and general equipment (quartermaster), general hospitals only.

Yearly reports and returns.—1. Return of medical property. 2. Estimate of repairs to hospitals and hospital stewards' quarters. 3. Annual requisition for medical supplies.

Occasional reports and returns.—1. Report of epidemic diseases. 2. Report of record books. 3. Report of deaths and interments. 4. Report of change of status, Hospital Corps. 5. Inventory and inspection reports. 6. Report of sales at public auction. 7. Report of change of combination of office safe. 8. Special requisitions, invoices, and receipts, etc.

Instruction in care of animals (third and fourth months) is given at the stable. The members of the class are taught the uses of the horse equipment, to mount and dismount with and without saddle, to harness horses, to hitch them to the ambulance, etc.

There has not been opportunity to teach ambulance driving to the extent of making each man a competent driver.

CARE OF ANIMALS (THIRD AND FOURTH MONTHS, THREE TIMES A WEEK).

1. Grooming. 2. Handling. 3. Feeding. 4. Watering. 5. Care after exercise. 6. The halter. 7. Watering bridle. 8. Curb bridle. 9. Saddle. 10. Saddle blanket. 11. To mount without saddle. 12. Position of the trooper without saddle and with saddle. 13. Holding the reins. 14. To dismount without saddle. 15. To harness horses and to hitch to the ambulance. 16. Ambulance driving.

III. RECORDS OF INSTRUCTION.

Each instructor keeps in a class book a list of the members of the class from which he calls the roll. After a recitation or drill he enters in the class book the comparative standing of each man during the hour. At the end of each week the instructor turns in to the company office the relative marks of the members of his class during the week, where they are entered in the records and placed before the company commander for his information.

At the end of each month the weekly class standings are consolidated, the members of each class are graded, and the results published, with the markings attained in each subject.

FIRST MONTH.

Setting-up drill, daily, one-half hour.
Marching and bearer drill, daily, two and one-half hours.
Anatomy and physiology, daily, one hour.
Elementary hygiene, daily, one hour.
Bandaging, daily, one hour.
Articles of War (first week), Saturday, one hour.

Hours outside drill	3
Hours inside instruction	3
Total number of hours daily for five days	6

SECOND MONTH.

Setting-up drill, daily, one-half hour.
Marching and bearer drill, daily, two and one-half hours.
Ambulance drill, tent pitching, first aid, daily, one hour.
Emergency cooking, daily, one hour.
Diets for the sick, daily, one hour.
Nursing and ward management (practical), daily, one hour.

Hours, outside drill 3
Hours, inside instruction 3
Total number of hours, daily, for five days 6

THIRD MONTH.

Setting-up drill, daily, one-half hour.
Bearer drill and field work, daily, one hour.
Company drill, daily, one-half hour.
First aid, daily, one hour.
Elementary pharmacy, daily, one hour.
Materia medica, daily, one hour.
Clerical work, twice a week, one hour.
Care of animals, twice a week, one hour.

Hours, outside drill 2
Hours, inside instruction 4
Total number of hours, daily 6

FOURTH MONTH.

Calisthenics, one-half hour, daily.
Company drill, one-half hour, daily.
Bearer drill, one hour, daily.
Care of animals, one hour, twice a week.
Materia medica, one hour, daily.
Pharmacy, one hour, daily.
Clerical work, one hour, daily.

NONCOMMISSIONED OFFICERS' CLASS.

This class has been divided into two sections, one consisting of privates who are candidates for promotion to the grade of acting hospital steward, and the other section including the noncommissioned officers of the company.

The instruction of the candidates' class includes the following subjects:

Clerical work.—Practical instruction.

Mess management.—Practical instruction in the company mess.

Army regulations.—Recitations.

Drill regulations.—Hospital Corps. Recitations.

The course of instruction in the noncommissioned officers' section has included:

Drill regulations.—Hospital Corps and Infantry as far as they relate to the course of instruction in company drill. Recitations.

Army regulations.—Recitations.

IV. METHODS OF IMPARTING DISCIPLINE.

1. The standard of discipline in the company or the detachment should be equal to that maintained in any arm of the service. With the class of recruits which have been received here during the past six months such a standard may be exceeded. The methods of maintaining discipline should, of course, be the same as those of the line of the Army.

2. A most useful incentive to this end is to encourage in the men a feeling of pride in their corps, to guard its honor and reputation at all times, teaching them that delinquencies of anyone reflect on the entire organization and on each member of it, and consequently that it is the duty of each man to aid in bringing offenders to justice. An esprit de corps thus established has caused privates to report their comrades for untidiness and boisterous conduct while on pass, for appearing in public places with women of doubtful character, etc. For the establishment of this feeling the influence of noncommissioned officers is most important, and it is through it that the result is to be obtained.

"The greater the individuality you give to the soldier himself and to his company * * * the more he feels that his individual conduct is of importance."

3. It, of course, is understood that a satisfactory state of discipline can only be imparted by inspiring the men's respect and confidence in their officers, the result of conscientious and painstaking interest in everything that concerns a soldier's welfare.

"In an army the bestowal of praise is the greatest of all moral terms." A knowledge that the duty a soldier performs is observed by his officers, and that duty of any character conscientiously performed and meriting approval will receive it, has never failed to stimulate men in their efforts to accomplish the highest results.

4. For minor breaches of discipline several methods of punishment have been in use in this company. For a first offense it has been customary to inflict no punishment, but the man has been admonished and made to understand the position he has placed himself in, the danger he is taking of permanently injuring his record, etc. An appeal to the man's reason and sense of honor has seldom failed of good result. Confinement to quarters, denial of pass privileges, and extra (squad) drill have been the usual minor punishments. When summary court-martial trials have been necessary, the sentence of confinement has been avoided in cases where there had been no previous convictions.

The discharge, without honor, of three incorrigible and disreputable privates of the company had a most gratifying effect on discipline, and at the same time relieved the organization of its only troublesome members, whose bad conduct had reflected on all.

5. The influence of class standing and the rivalries it has created has had a beneficial effect in stimulating effort and encouraging all to do their best. Promotion has been largely dependent upon a man's class record. The improvised grade of lance acting steward has been utilized in rewarding excellence in studies and conduct, the appointment having been given before the man was qualified for examination for promotion.

V. PRACTICAL INSTRUCTION IN THE HOSPITAL.

I would suggest the following plan:

After the Hospital Corps recruit has completed his four months' course of instruction in the company he is transferred for "special duty" in a general or a large post hospital, to which is attached the company of instruction. The men on duty in the hospital are divided into the "permanent" and "temporary" forces.

1. The permanent force, consisting of noncommissioned officers and instructed privates who by reason of experience and other qualifications, are in charge of the various departments or subdivisions of the hospital organization. The permanent force should constitute about one-third of the hospital personnel, and each man should ordinarily retain the same duties at least three months. Also, in order not to cause confusion by interfering with the hospital routine, changes should affect but a part of the force at one time. The members of the permanent force also constitute the instructors of the temporary force.

2. The temporary force consists of men transferred from the company to the hospital for instruction. The transfers are to take place monthly, the men being distributed throughout the hospital. Their service while in the hospital should be about as follows:

Two months in the medical wards, the second month as senior or head nurse, if practicable.
Two months in the surgical wards, including service in the operating and dressing rooms.
Two months in the dispensary, the last month to be spent as senior assistant, if practicable.
Two months in the kitchen, including service in the diet kitchen.
Two months in the office.
One month in the stables.
One month on police duty.

At the completion of this service a man will have served in all departments of the hospital, and if he is of average intelligence, of good character, and interested in his work he should be a well-instructed Hospital Corps man.

The consensus of opinion is that it takes two years to make a good cavalry soldier and one year to make a good infantryman. To make a trained sanitary soldier from the average recruit without previous experience in any of his duties I think that the period of fourteen months herein recommended is not unnecessarily long. It should be remembered that from the time he enters the hospital the man performs the usual duties of the men of his corps. His services increase in value as the extent of his instruction increases.

Men with previous experience in cooking, pharmacy, nursing, clerical work, or in the line of the Army may of course be advanced more rapidly. This also may be done in the case of men of unusual aptitude and intelligence who are candidates for promotion, but who have had no previous experience.

Ordinarily I would not recommend a candidate for promotion to the grade of acting hospital steward until he had completed four months in the company or its equivalent and had served at least two months in the hospital. If he was in his first

enlistment and had had no previous experience in cooking, nursing, pharmacy, or clerical work I would not recommend his promotion until he had completed four months in the company and at least ten months in the hospital.

VI. CHARACTER AND EXTENT OF INSTRUCTION AFTER ASSIGNMENT TO POST HOSPITAL.

I would suggest that a plan of instruction be adopted at each post to extend over ten months of the year, the remaining two months being reserved for field service, practice marches, etc.

The instruction to be given for at least one hour daily (as required by existing regulations) in the following subjects:

1. Bearer drill, 40 hours (two months).
2. Fieldwork, including the use of the field equipment, 20 hours (one month).
3. Anatomy and physiology, 20 hours (one month).
4. First aid, 40 hours (two months).
5. Nursing, 40 hours (two months).
6. Elementary hygiene, 20 hours (one month).
7. Materia medica and pharmacy, 20 hours (one month).

As instruction in diet cooking, clerical work, and care of animals should be given while the men are on duty in the kitchen, the stables, and the office, these subjects are not considered in the schedule.

It would be well to have the "school year" end with the instruction in bearer drill and field work preparatory to the practice march with the troops of the post. Should the practice march be concluded within a month I would suggest that whenever practicable the hospital corps go into camp at the post, closing the post hospital and establishing a field hospital, where post sick are to be transferred and treated.

The number of subjects to be taught at one time will vary with the medical officer's experience. My experience has inclined me to think that the best results are obtained with two subjects taught on alternate days until they are concluded.

VII. CLASSES IN THE HOSPITAL CORPS.

To increase the efficiency of the Hospital Corps I have the honor to recommend the establishment of two grades among privates, with a separate rate of pay for each grade—first-class privates at $20 per month and second-class privates at $15 per month. The relative numbers of each class to be 3 of the first class to 2 of the second class. All privates to be enlisted in the second class and advancement to the first class to depend on special qualifications and fitness for the position, as in promotion to the grades of acting hospital steward and hospital steward, position in the first class to be dependent on continued good behavior and attentiveness to duty.

Privates of the first class to be qualified in one or more of the following lines of duty:

Pharmacy.
Nursing.
Cooking.
Clerical work (stenography).
Carpentry.
Blacksmithing.
Ambulance driving, etc.

Recruits with training in any of these lines could be advanced on showing fitness after a few weeks' trial. Others to be promoted to the first class as they become qualified therefor and as vacancies occur.

The advantages of such a classification are as follows:

(1) The increase in pay would more generally attract desirable men.

(2) Men with special qualifications but who for various reasons are not fitted for the grade of acting hospital steward would still receive increased pay and other emoluments. In short, the grade of first-class private would be a recognition of special qualifications.

The duties of hospital corps men are now so specialized that it is impracticable to attempt to make the average recruit competent to fill every position in a large hospital. Therefore let a man qualify in one line of work for which he has aptitude and liking.

Men not qualified for the first class to remain in the second class on duty as police, orderlies, stablemen, etc. The pay of the second-class private at $15 is more than that of a private of the line and would be ample compensation for the duties performed. At present the pay of all is alike, and the man capable only of manual work receives the same amount as a competent nurse, dispensary attendant, or stenographer.

(3) The cost of the Hospital Corps would not be increased by the change to two classes as herein proposed.

The pay of 100 privates at $18 is		$1,800
The pay of 60 first-class privates at $20 would be	$1,200	
The pay of 40 second-class privates at $15 would be	600	
		1,800

VIII. COMPANY ORGANIZATION.

With a view to uniformity and as the most effective and satisfactory method of training hospital corps men, I would suggest that companies of instruction be attached to general or post hospitals having a capacity of 30 beds or more. All hospital corps men on duty at the post to belong to the company or companies, those on duty in the hospital to be considered as on "special duty." The number of men detached from the company for special duty in the hospital should not exceed one-third of the company. The maximum quota of a company having, say, 150 men, one company could ordinarily furnish for hospital duty the necessary detail for a hospital of 150 beds and have 100 men for company duty. At hospitals having a capacity of over 150 beds more than one company might be attached; for hospitals of, say, 160 to 300 beds, two companies; over 300 to 400 beds, three companies; over 400 to 600, four companies, etc.

Suppose, for example, there was attached to a 150-bed general hospital a company of instruction of 150 men. Fifty men would be on special duty in the hospital, one-third of whom (say, 17) constituting the permanent force and two-thirds (say, 33) making up the temporary force, or those under instruction. After a few months this hospital could turn out about 20 trained hospital corps men each month, including the necessary quota of noncommissioned officers—men who had had four months' instruction in the company and had passed through the different departments of the hospital—without in any way interfering with its most efficient and economical administration. Two or three such companies attached to large hospitals could supply the Army and could keep it supplied with uniformly trained hospital corps men, a result well worthy of consideration.

In time of war the uniform training of all recruits might be begun at once by organizing as many companies of instruction as were necessary and attaching them to base hospitals. Should the conditions necessitate the mobilization for field service with the least possible delay the recruits might be passed through the company, equipped, and sent to the field without hospital instruction. The length of the period of instruction in the company might also be reduced. Hospital training being least necessary in the personnel of ambulance companies and the regimental medical service, men without such training should preferably be supplied to these places and the men with hospital experience reserved for service at base or permanent hospitals and large field (division) hospitals.

LIST OF CALLS FOR COMPANY OF INSTRUCTION, HOSPITAL CORPS, JUNE 30, 1901.

	A. M.		P. M.
First call	5.30	School call	1.45
Assembly	5.50	Recall	2.45
Calisthenic drill	6.00	School call	2.50
Recall	6.30	Assembly	3.00
Breakfast	6.30	Recall	4.00
Police	7.00	Drill call	4.30
Company drill	7.45	Recall	5.30
Recall	8.15	Supper	6.00
Drill call	8.20	Sick call	5.45
Assembly	8.30	Retreat, first call	6.20
Recall	9.30	Assembly	6.30
School call	9.40		
Assembly	9.50		
Recall	10.50		
Dinner	11.45		

Saturday inspection.

First call	7.45 a. m.
Assembly	8.00 a. m.

CALISTHENIC EXERCISES, COMPANY OF INSTRUCTION, GENERAL HOSPITAL, WASHINGTON BARRACKS, D. C., 1907

PERSONAL EQUIPMENT OF A PRIVATE OF THE HOSPITAL CORPS.

COMPANY OF INSTRUCTION, UNITED STATES ARMY,
GENERAL HOSPITAL,
Washington Barracks, D. C.

1. Clothing list.

1 blanket.
1 blouse, complete.
1 forage cap.
2 cap ornaments.
2 pairs hospital corps insignia.
1 canvas coat.
2 summer coats.
6 collars.
4 pairs drawers.
4 undershirts.
6 pairs gloves, Berlin.
1 campaign hat.
1 campaign hat cord.
1 pair leggings.
1 overcoat (winter).
1 poncho.
2 muslin shirts.
2 blue shirts.
1 pair black shoes.
6 pairs socks.
1 pair blue trousers.
1 pair canvas trousers.
2 pairs summer trousers.
1 pair trouser stripes.
1 suit khaki (field uniform).
1 pair russet shoes.

2. Medical Department property.

1 hospital corps pouch.
1 litter sling.
1 Week's Nursing.
1 Smart's Handbook.
1 Doty's Prompt Aid.
1 Hospital Corps Drill Regulations.

3. Ordnance property.

1 canteen and strap.
1 haversack and strap.
1 waist belt and plate.
1 meat can.
1 tin cup.
1 knife, fork, and spoon.

4. Quartermaster's property.

1 shelter tent, half, poles, and pins.
1 barrack bag.
4 sheets.
2 pillow cases.

COMPANY REGULATIONS.

COMPANY OF INSTRUCTION, HOSPITAL CORPS,
Washington Barracks, D. C.

1. The following regulations will be observed for the maintenance of order and discipline in the company of instruction.

2. The orders of noncommissioned officers, when in the execution of their duties, shall be promptly obeyed without question or remark.

3. Whenever any member of this company thinks himself wronged by any order from a noncommissioned officer he may, after compliance with the order, report the fact to the commanding officer.

4. Noncommissioned officers shall be addressed, under all circumstances, by the title of their rank.

5. Smoking is strictly prohibited in the squad rooms between the hours of 8 a. m. and 5 p. m.

6. No indecent, profane language or boisterous behavior will be allowed in any part of the company barracks.

7. Lights in the squad rooms will be extinguished at 9 p. m. After that hour all talking and other noises in the squad rooms or talking or loitering on the porches is strictly prohibited.

8. There will be an inspection of quarters at 11 p. m. Those not on pass must be in their beds at that hour.

9. Citizen clothing will not be kept in the squad rooms. As soon as the uniform is obtained civilian clothing must either be disposed of or kept in the storeroom.

10. Citizen clothing will not be worn on pass unless special permission is obtained from the company commander.

11. Appearing outside the squad rooms in shirt sleeves or blouses unbuttoned is strictly prohibited.

12. The following uniforms are authorized from this date until further orders:

1. Blue cap, blue blouse, and blue trousers; black shoes.
2. Blue cap, blue blouse, and white trousers; tan shoes.
3. White cap, white blouse, and white trousers; tan shoes. Barracks shoes will not be worn outside the quarters. The campaign hat may be worn in wet weather.

All enlisted men of the command who leave the garrison or hospital grounds will confine themselves to these uniforms.

13. The uniform for drill, inspections, fatigue, and field exercises will be prescribed by the commanding officer of the company of instruction.

14. The brown canvas suit will be worn on fatigue only.

15. No one will be allowed to enter the kitchen or dining room between meal hours except on duty.

16. Beds must be neatly made up before reveille. No one, unless on sick report, will lie on his bed before dinner.

17. Every member of this company shall take a bath and change his linen at least once a week.

18. Ball playing is prohibited on the United States Army General Hospital grounds.

19. Owing to the malarial conditions prevailing at this post, it is forbidden to loiter on the banks or lie or walk on the grass near the river after retreat.

20. No intoxicating liquors will be brought into the company squad rooms.

21. Application for passes must be made at 6 p. m. on the day before they are to go into effect.

LEAVING THE GARRISON.

Except on Saturdays, Sundays, and holidays, no private on duty with the company of instruction will be permitted to leave the garrison between reveille and retreat roll calls without the permission of the company commander or written permission from the noncommissioned officer of the company. In every case where such permission has been granted the man will report his departure and return to the company office.

DISPOSING OF CLOTHING.

Attention is called to the provisions of the seventeenth article of war, which prescribes the penalties for selling or otherwise disposing of articles of equipment or uniform clothing.

Hereafter, immediately after the weekly inspection, each member of this company will display on his bed, neatly arranged, all the articles of clothing issued to him by the Government, for inspection and verification by the noncommissioned officer in charge of his squad.

Any man found to be lacking an article of clothing which has been supplied to him by the Government will be reported at once.

PASSES.

The following is published relative to the granting of passes:

Special passes will not be granted except in cases of urgent necessity.

All passes will be from 6 p. m. to 11 p. m., with the exception of ten men daily, who will be allowed to be absent until 6 a. m. The men composing the permanent force on duty with the company will be allowed passes until 12 p. m.

Uniform will be the dress for all. Special permission from the commanding officer must be obtained to wear civilian clothing while on pass.

All the men of this company are required to pay special attention to their personal appearance, their cleanliness and neatness, before leaving the post. Blouses and overcoats must be buttoned and kept so.

Passes for enlisted men of this command will be sent daily, at 6 p. m., to the gate guard, Washington Barracks, and will be sent for daily at guard mount. Enlisted men going on pass will report at the gate guardhouse their departure and return so that this date may be entered on the pass list.

Hereafter, and until further orders, the noncommissioned officer in charge of the gate guard at the time will require all members of the Hospital Corps coming in the gate between the hours of 11 p. m. and 6 a. m. to write their signatures on the pass list sent to the guard from this hospital.

In case of refusal the Hospital Corps man so refusing will be arrested and confined and report thereof made to the commanding officer, General Hospital, at 9 a. m. the following morning.

FIELD EXERCISES, COMPANY OF INSTRUCTION, GENERAL HOSPITAL, WASHINGTON BARRACKS, D. C., MAY 28, 1921.

DUTIES OF NONCOMMISSIONED OFFICER IN CHARGE OF BARRACKS.

The noncommissioned officer in charge of barracks will be detailed daily by roster from noncommissioned officers on duty with the company.

He will go on duty at 9.15 a. m. and will be relieved by his successor at the same time on the following day.

He will report to the commanding officer of the company when going on duty and when relieved.

While on duty he will sleep in the guard room and between the hours of 9 a. m. and 6 p. m. will be habitually in the guard room, except when attending to his duties as herein prescribed.

His duties are as follows:

To take roll calls from noncommissioned officers in charge of squad rooms at taps and reveille.

To receive reports from the watchman and from noncommissioned officers in charge of squad rooms.

In case of fire to give the alarm and proceed as ordered in the fire regulations.

He will make an inspection of all quarters at 11 p. m., noting all absentees of the company not on pass and see that all unauthorized lights are extinguished.

Members of the company returning between the hours of 9 p. m. and 6 a. m. will report to him.

The watchman will be under his immediate orders and he will be responsible for the efficient performance of the latter's duties.

DUTIES OF WATCHMAN.

He will report for duty to the noncommissioned officer in charge of barracks daily at 9 p. m., at 11 p. m., and on being relieved at 6 a. m., and at other times when necessary.

During his tour of duty he is subject to the orders of the commanding officer of the hospital, the commanding officer of the company, and the noncommissioned officer in charge of barracks.

He will patrol the grounds of the post at least every three hours.

He will constantly be on the alert for fires, lights, and unauthorized persons in the post, immediately reporting all unusual occurrences and violations of existing orders which come under his observation to the noncommissioned officer in charge of barracks.

REPORTS OF NONCOMMISSIONED OFFICERS.

Hereafter all noncommissioned officers will report for instructions at the company office at 8 a. m. They will report the status of the work and the immediate needs of the departments of which they are in charge, and instructors will also report the subjects of instruction in each class during the day. Suggestions relating to their departments and also to the welfare of the company are requested and should be made at this time.

The school at Fort McDowell, Angel Island, Cal., under command of Capt. William H. Wilson, assistant surgeon, United States Army, may be considered as a receiving and distributing depot rather than an educational institution. Through it for the most part the Division of the Philippines was supplied, each transport carrying besides the permanent detachment for duty aboard a greater or less number of men of the Hospital Corps for duty in Hawaii and Manila. Ninety-two men were sent from this station in August and 150 in September, 1900, part of whom went to China for duty with the relief expedition. This station was also used as a depot for men of the corps returned from the Philippines to the United States for various reasons, excepting those sent for treatment who went to the general hospital at the Presidio. The former were distributed to posts in the United States nearest their places of enlistment for duty, or for the restoration of their health after a tour of duty in the tropics, and were replaced by men recently enlisted

and awaiting transportation to the Philippine Islands. The methods obtaining at this school may be learned from the following report:

SCHOOL OF INSTRUCTION,
Fort McDowell, Cal., December 31, 1900.

SIR: I have the honor to submit the following report covering the year 1900 at this school.

During this time there have come and gone the following:

Enlisted men at school January 1, 1900	46
Female contract nurse (as dietist)	1
Gained by transfer	1,105
Gained by enlistment	3
Total	1,155
Lost during the year:	
By transfer to the Philippines	780
By transfer to Honolulu	6
By transfer to China	1
By transfer to hospitals in United States	240
By transfer to Signal Corps	1
Discharged	20
Deserted	9
By transfer to United States Army transports	28
Total	1,085
Enlisted men remaining at school December 31, 1900	69
Female contract nurse (as dietist)	1
Total	70

The course of instruction was necessarily made short, owing to the great demand for men in our foreign possessions, and I arranged it to cover a period of four weeks and a daily instruction of six hours, so that those who properly applied themselves could not help gathering some knowledge of their duties.

The instruction consisted in first carefully giving them a knowledge of each of the regulations that affects them as soldiers of the Army and the importance of maintaining military discipline. This is taught by lectures, reading of Articles of War and Regulations frequently, and punishments of every infraction of discipline.

Lectures are given daily, both demonstrated and illustrated, on anatomy and physiology to a moderate degree, nursing, first aid, and minor surgery.

An hour each day is devoted to practical work, which includes bandaging, applying the first-aid packet to all parts of the body, taking and recording of temperatures, artificial respiration and resuscitation.

One hour a day is given to drill, litter-bearer drill, and the different methods of carrying a wounded man and applying temporary dressing on the field. Setting-up drill is given for half an hour each morning to straighten up the new recruits and limber up any stiff joints for the work of the day.

For the cooking, the classes are divided into four sections of about ten men each in order that each man may have practice in preparing each article of diet as he is directed to. This department is under the immediate superintendence of Miss Stoker, a contract nurse, and she performs her work with great satisfaction to all concerned.

Another feature of the instruction which was omitted from my last report is that given in office work and the preparation of the official papers. Many men have left this school able and efficient clerks who knew but little about these matters when they first entered the office.

It will be noted that during the year but two privates reached the grade of acting hospital steward while at this school, for the reason that only those were recommended to take the examination who were fully qualified, and these two, it can be said to their credit, passed a very creditable examination.

The grade of lance acting steward is given to men who have shown ability and aptitude to take charge of squad rooms or assist at drills or classes, and while acting as such they wear the chevron of a corporal, but this grade does not follow them after leaving this school.

Before closing this report, I wish to invite attention to the great assistance rendered me by Hospital Steward Michael Leahy. He is thorough, careful, and conscientious in the discharge of all his duties, and controls the men under him at this school, many of whom are recruits, in an excellent and soldierly manner.

Very respectfully,

WILLIAM H. WILSON,
Captain and Assistant Surgeon, U. S. A.,
Commanding School of Instruction.

Schedule of instruction, Fort McDowell.

Hours.	Monday.	Tuesday.	Wednesday.
A. M.			
7.10–7.40	Setting-up drill	Setting-up drill	Setting-up drill.
8–8.45	Study	Study	Study.
9–10	Section A. Cooking, litter drill.	Section D. Cooking, litter drill.	Cooking, review.
10.15–11.15	Lecture	Lecture	Lecture.
P. M.			
1.30–2.30	Section B. Cooking, bandaging, and practice work.	Section A. Cooking, bandaging, and practice work.	Fatigue.
2.20–3.30	Section C. Cooking, study.	Section B. Cooking, study.	Do.

Hours.	Thursday.	Friday.	Saturday.
A. M.			
7.10–7.40	Setting-up drill	Setting-up drill	
8–8.45	Study	Study	
9–10	Section C. Cooking, litter drill.	Section B. Cooking, litter drill.	Inspection.
10.15–11.15	Lecture	Lecture	Articles of war.
P. M.			
1.30–2.30	Section D. Cooking, bandaging, and practice work.	Section C. Cooking, bandaging, and practice work.	
2.30–3.30	Section A. Cooking, study.	Section D. Cooking, study.	

The company of instruction at Manila was principally used for the instruction of men newly arrived from the United States who were so hastily recruited that no opportunity for training or discipline had been afforded. It was also used as a depot of assembly and distribution, as will be learned from the following report by Capt. John S. Kulp, assistant surgeon, United States Army, dated June 18, 1900:

A Hospital Corps company of instruction had been needed in this division ever since the American occupation, but owing to the dearth of medical officers and Hospital Corps men, as well as to other obstacles, it was not practicable until January, 1900, to obtain a sufficient number for systematic instruction. With this object in view the following letter was written, under the caption "Proposed increase in capacity for sick:"

SUPPLEMENTARY WARDS,
Manila, January 1, 1900.

The CHIEF SURGEON DEPARTMENT PACIFIC AND EIGHTH ARMY CORPS.

SIR: I have the honor to make the following recommendations in regard to the increase of the number of beds available for the sick, and the more systematic instruction of the men of the Hospital Corps:

The number of men casually at the First Reserve and other hospitals can be assembled in one place and regularly instructed in the various duties of the sanitary soldier, thus allowing the place which they now occupy to be given over to the sick, and also providing a number of well-instructed men for the various and constant demands made for them.

A suitable place is found in the abandoned magazine and its fortification adjoining this hospital. It could be made habitable by the following changes: (*a*) The removal of the present foot bridge, which is unsafe, and its change to a more suit-

able location; (*b*) the cutting of five windows in the magazine and the addition of a door, thus fitting it for officers' quarters; (*c*) the thorough cleaning of the whole inclosure.

For a company of instruction, varying between 40 and 100 men, the following administrative personnel would be required: One medical officer, 4 noncommissioned officers, and 1 private. For their subsistence at this hospital, an additional force of 4 privates.

JOHN S. KULP,
Captain, Assistant Surgeon, U. S. A.

[First indorsement.]

Respectfully forwarded to division headquarters, approved and recommended. If this plan be carried out, 75 beds in the First Reserve Hospital, that are now occupied by Hospital Corps men on duty there, together with the casuals belonging to the corps, who are constantly arriving from the United States, can be placed under conditions where they can be disciplined, properly handled, and instructed in their duties. The expense appears to be trifling, and the personnel can be taken principally from men now at the hospital.

CHARLES R. GREENLEAF,
Colonel, Assistant Surgeon-General, U. S. A., Chief Surgeon.

[Fourth indorsement.]

Respectfully forwarded to the adjutant-general of the division, recommending approval, the allotment, etc.

C. P. MILLER,
Major and Quartermaster, U. S. A., Chief Quartermaster.

[Fifth indorsement.]

Respectfully returned to the Chief Quartermaster, approved as indicated in the fourth indorsement.

By command of Major-General Otis:

THOS. H. BARRY,
Assistant Adjutant-General.

This request being granted, 14 men were transferred by the middle of January, and although they were not the most efficient and soldierly men of the corps, they formed a nucleus, and others of a better class were obtained by transfer from the line and also from various detachments. At first the discouragements were many, and the final success of the organization is principally due to the constant supervision and assistance rendered by the chief surgeon.

Location.—The place selected is the Redan San Carlos, a part of original fortifications, which date back to 1591. They were remodeled in 1604, 1691, and again in 1762, and are in an admirable state of preservation. It is very questionable whether artillery was ever mounted in this particular fortification, although it is practically impregnable to unsupported infantry. The foliage-covered walls inclosed a space filled with rank vegetation and small trees, the center of which was the massive stone magazine. With the exception of the gun emplacements, which are of Chinese granite, the masonry is of the same Roman cement blocks as is used on the walls of the city. The labor of cleaning out was interrupted by the finding of three pythons, the largest of which was over 11 feet in length. These, together with monkeys, wild bees, centipedes, lizards, and enormous spiders, have been the only inhabitants for many years.

The guard and lecture tents are on the walls, which range from 18 to 45 feet in thickness, while 18 hospital tents in the gun emplacements furnish quarters. Each is framed and floored over the granite, and a 6-inch terra-cotta pipe running through the wall affords excellent drainage for each. At high tide the moat surrounding the redan is filled with 6 feet of water, beneath which is mud of unexplorable depth. The moat is kept free of vegetation in order not to obstruct the flow of water, and the camp has been remarkably healthy.

Sea bathing is convenient, but most of the men prefer the baths of hospital No. 3, which are easily accessible.

In order to place the company upon a sounder official footing, the following order was issued on the recommendation of the company commander:

[General Orders, No. 23.] MANILA, P. I., *May 23, 1901.*

In view of the necessity for properly instructing small detachments of the Hospital Corps, and because of the number of untrained men constantly reporting for duty, a Hospital Corps company of instruction is hereby established, to be located in the city of Manila.

1. The personnel of said company will consist of 2 medical officers, 1 hospital steward, 3 acting hospital stewards, 2 Hospital Corps privates, in addition to 60 men under instruction.

2. The curriculum will consist of such practical and theoretical instruction as may be necessary to insure proficiency in all the duties of the sanitary soldier, and will extend over a period of fourteen weeks. The faculty of the school will consist of its commanding officer and such other instructors as the chief surgeon may designate from among the medical officers serving in Manila.

3. At the completion of the course those passing satisfactory examinations will receive the certificate of the school; those passing special qualifications will be recommended for promotion to the grade of acting hospital steward.

4. The discipline and internal administration of the school will conform to that of a company of infantry.

5. The chief surgeon of the division is authorized to take such measures as will result in the transfer of men to and from the company, as may be indicated by the needs of the service.

By command of Major-General MacArthur:

M. BARBER,
Assistant Adjutant-General.

The periods of instruction are as follows:

Hour.	Monday.	Tuesday.	Wednesday.
A. M.			
7.15–8.15	Drill	Drill	Drill.
9.40–11	Study hour	Study hour	Study hour or signal drill.
11–12	Pharmacy	Minor surgery	First aid.
P. M.			
3–4	First aid	Elementary anatomy and physiology.	Do.
4–5.25	Study hour	Study hour	Study hour.

Hour.	Thursday.	Friday.	Saturday.
A. M.			
7.15–8.15	Drill	Drill.	
9.40–11	Study hour	Study hour	Inspection (10 a. m.).
11–12	Regulations and discipline.	Nursing	Drill.
P. M.			
3–4	Clerical work	First aid.	
4–5.25	Signal drill	Study hour.	

While receiving practical instruction in wards men will attend all lectures; while receiving practical instruction in cooking men will attend afternoon lectures; while receiving practical instruction in diet cooking men will attend all lectures.

The course covers between sixteen and eighteen weeks and consists of 105 periods of theoretical and one hundred and twenty hours of practical instruction. In addition, each man is detailed for seven days in a hospital ward under the instruction of its surgeon. During this time he is taught the practical routine work of the ward, the actual contact with patients, methods of treatment, and administration of medicines, all of which are considered indispensable.

Cooking can not be taught theoretically with success, even from such excellent aids as the Manual for Army Cooks and Munson's Emergency Diet for the Sick. Every man is put in the main kitchen of Hospital No. 3 and is taught the actual cooking by the second cook there. No more than two men are under instruction at any one time and the minimum period is five days. Those showing real aptitude are then given additional instruction in this branch. After serving in the main kitchen the recruit receives three days of training in that for light diet. Here, where over 300 meals are prepared daily, he acts as assistant to the second cook and is taught the tasteful serving and the preparation of a few standard delicacies rather than an imperfect smattering of the whole subject. But one man is under instruction at a time in this place.

Of the practical instruction the cultivation of upright and soldierly habits and the

inculcation of thorough discipline are considered of great importance because of the peculiarly grave duties of the Hospital Corps private, especially in detached commands, where the trustworthiness of the sanitary soldier becomes a matter of life or death. The daily drill in marching, the manual of the loaded litter and travois, is made sharp and progressive. Fieldwork in handling patients, applying dressings, and surmounting obstacles is taught on three afternoons a week throughout the whole course, while each member of the class is given enough of signal drill to enable him to use this system of communication in emergencies.

A synopsis of the theoretical instruction is as follows, each course consisting of lectures, demonstrations, and recitations:

PHARMACY (MONDAY, 11–12 A. M.; LIEUTENANT MILLHOFF, INSTRUCTOR).

Lecture 1.—The weights and measures, their origin and bases, relation to each other, with especial regard to the metric system.
Lecture 2.—The abbreviations and terms of pharmacy.
Lecture 3.—Simple definitions of the preparations. The tincture, fluid extract, extract, pill, ointment, etc.
Lecture 4.—The operations of pharmacy, filtering, etc.
Lecture 5.—Practical points on dispensary work, cleanliness, systematic arrangements, care of scales, etc., dispensing, with especial reference to poisons.
Lecture 6.—The ingredients and doses of some of the simpler remedies such as seidlitz and Dover's powders, compound cathartic pills, etc.
Lecture 7.—The alkaloids in general, their sources, formation, and doses of their salts.
Lecture 8.—The alkaloids in most common use, morphine, quinine, etc.
Lecture 9.—Opium, source, doses, and strength of preparations.
Lecture 10.—Mercurial preparations, arsenic, and iron.
Lecture 11.—The general classification of drugs according to their physiological action, stimulants, depressants, etc.
Lecture 12.—The various antidotes to poisons.
Lecture 13.—General instruction on the subject-matter of the first seven lectures.
Lecture 14.—The same on the remaining lectures. Questions by the class.
Lecture 15.—General review, prescription reading.

MINOR SURGERY (TUESDAYS, 11–12 A. M.; ACTING ASSISTANT SURGEON A. W. WILLIAMS, INSTRUCTOR).

Lecture 1.—Informal talk on surgical procedures in general, cleanliness, preparation of the operating room, hands, instruments, dressings, etc.
Lecture 2.—The preparation of the patient for an operation where a general anæsthetic is required. Field of operation.
Lecture 3.—Anæsthetics, general and local. Their indications.
Lecture 4.—Administration of a general anæsthetic. Contra-indications.
Lecture 5.—Care of patients after operation.
Lecture 6.—Wounds, their varieties, causes, and treatment.
Lecture 7.—The healing of wounds.
Lecture 8.—Hemorrhage, varieties, causes, and treatment.
Lecture 9.—Ulcers and abscesses, causes, varieties, and treatment.
Lecture 10.—Sprains and bruises.
Lecture 11.—Dislocations, with special reference to diagnosis.
Lecture 12.—Fractures in general, special fractures, splinting.
Lecture 13.—Minor amputations, gangrene.
Lecture 14.—The anatomy, care, diseases, and extraction of teeth.
Lecture 15.—General review.

ELEMENTARY ANATOMY AND PHYSIOLOGY (TUESDAYS, 3–4, P. M.; MAJOR KULP).

Lecture 1.—(Text-book, Pilcher.) The human machine; what is meant by energy, life, and the lower forms of life.
Lecture 2.—The cell, varieties, life history, specialization.
Lecture 3.—The skin and its functions.
Lecture 4.—The fat and its uses.
Lecture 5.—Review.
Lecture 6.—The bones and the joints.
Lecture 7.—The nervous system.
Lecture 8.—The blood and its circulation.

Lecture 9.—The arteries.
Lecture 10.—Review.
Lecture 11.—The apparatus and mechanics of respiration.
Lecture 12.—Digestion.
Lecture 13.—The viscera.
Lecture 14.—The special senses.
Lecture 15.—Review.
Lecture 16.—Physiology as a whole.
Lecture 17.—Microorganisms.
Lecture 18.—Infection and its prevention.
Lecture 19.—General field hygiene.
Lecture 20.—Review.

FIRST AID (WEDNESDAYS, 11–12 A. M.; ACTING ASSISTANT SURGEON VAN METER, INSTRUCTOR).

Lecture 1.—Outline of the subject and scope of its operation.
Lecture 2.—Gross topography of the body; explanation of the more simple technical expressions.
Lecture 3.—The vulnerable parts of the body.
Lecture 4.—Bandages and dressings, with special reference to fractures.
Lecture 5.—Classification of various first-aid dressings and their applications.
Lecture 6.—The wounds and injuries of the battlefield.
Lecture 7.—The application of first-aid dressing to wounds.
Lecture 8.—Hemorrhage in detail.
Lecture 9.—Specific hemorrhage, in regard to treatment.
Lecture 10.—The emergency treatment of unconsciousness in general.
Lecture 11.—Asphyxia, suffocation, poisons.
Lecture 12.—Emergencies in general.
Lecture 13.—General review of first half of course.
Lecture 14.—General review of remainder of course.
Lecture 15.—Quiz and questions by the class.

REGULATIONS, ALLOWANCES, AND DISCIPLINE (THURSDAYS, 11–12 A. M.; HOSPITAL STEWARD HARTFORD, INSTRUCTOR).

Lecture 1.—The Army Regulations and Articles of War, with special reference to those affecting the Hospital Corps soldier in his relations to other branches of the service.
Lecture 2.—Continuation of the same subject.
Lecture 3.—The duties of an orderly in detail. How to transmit and receive messages; how to address superiors; the various ranks and their insignia.
Lecture 4.—Changing station. The proper course for an order. The ration, transportation, arrival, and reporting.
Lecture 5.—Records, and why they are necessary. A general discussion of how to take charge of the papers of a detached command.
Lecture 6.—Morning report of Hospital Corps detachment. Report of sick and wounded, and special reports to brigade and division headquarters.
Lecture 7.—Inventory and classification of property.
Lecture 8.—Want list. List of condemned property. Requisitions, annual, special, emergency, etc. Invoices and receipts. Clearances.
Lecture 9.—Management of the various kinds of property. Memorandum receipts.
Lecture 10.—The ration return, and the accumulation and use of the savings thereof. Fuel, forage, and illuminating supplies.
Lecture 11.—Official letter writing, briefing, and indorsing.
Lecture 12.—Descriptive lists, clothing accounts, and schedules.
Lecture 13.—Discharge and final statements.
Lecture 14.—The routine monthly reports.
Lecture 15.—General monthly review.

CLERICAL WORK (THURSDAYS, 3–4 P. M.; HOSPITAL STEWARD ARMSTRONG, INSTRUCTOR).

Lecture 1.—Necessity and advantage of neatness and accuracy.
Lecture 2.—The ration return. Commutation and savings of ration.
Lecture 3.—Clothing, how obtained, stored, issued, and accounted for.
Lecture 4.—The property responsibility of enlisted men, with special reference to the Hospital Corps.

Lecture 5.—Medical property, how obtained, to whom issued, how and to whom accounted for. Lost property.
Lecture 6.—Quartermaster property in the same detail.
Lecture 7.—Ordnance property in the same detail.
Lecture 8.—Register of patients and report of sick and wounded.
Lecture 9.—Briefing and indorsing official correspondence.
Lecture 10.—Muster and pay rolls, descriptive lists, Hospital Corps returns, and recruiting papers.
Lecture 11.—Proceedings of boards of survey and courts-martial.
Lecture 12.—Discharge for disability. The preparation of discharge certificates and final statements.
Lectures 13, 14, 15.—A quiz by the instructor in relation to the subject-matter of the preceding lectures, and responses to questions by the class.

NURSING, HYGIENE, AND WARD MANAGEMENT (FRIDAYS, 11–12 A. M.; ACTING ASSISTANT SURGEON W. J. LYSTER, INSTRUCTOR).

Lecture 1.—(Text-book, Weeks.) The ward duties of a nurse. Cleanliness, order, economy, system, noise, etc.
Lecture 2.—Beds, common, field, air, and water. Bedding and its care. Bed sores.
Lecture 3.—The pulse, temperature, respiration, ventilation.
Lecture 4.—Symptoms, attitude, expression, subjective and objective. The faculty of observation.
Lecture 5.—Medicines, their administration; prescription reading; names of common drugs.
Lecture 6.—How medicines act. Dosage.
Lecture 7.—Poisons.
Lecture 8.—External medication, counterirritants, rubefacients, vesicants, cupping, leeches, poultices, etc.
Lecture 9.—Enemata, injections, purgatives, baths, and massage.
Lecture 10.—Parasites, internal and external.
Lecture 11.—Infectious diseases and their prevention.
Lecture 12.—Surgical nursing, operations, hemorrhage.
Lecture 13.—Emergencies.
Lecture 14.—Hygiene in general.
Lecture 15.—The hygiene of the ward.
Lecture 16.—The management and discipline of the ward.
Lecture 17.—The records of a ward.
Lecture 18.—General review.

The examinations are both written and oral, and the certificate of the school is given only to those who are fitted for the special work of the Hospital Corps private. The final mark is based on (*a*) character and habits; (*b*) practical proficiency as reported by the first sergeant, ward masters, and cooks; (*c*) the written examination in each theoretical subject; and (*d*) the result of drill, field work, signal proficiency, and recitations. Of the last class of 43 there were 13 graduates.

The discipline and administration conforms to that of a company of infantry. The permanent personnel consists of a commanding officer, first sergeant, drill sergeant, quartermaster-sergeant, clerk, and bugler. The two latter are privates of the Hospital Corps, the acting sergeants being noncommissioned officers of the same.

The graduating exercises of the first class were held on the 15th of June, in the presence of the major-general commanding and the chief surgeon of the division. The following programme was carried out:

Selection, by Sixth Artillery Band.
Practical exercises with roller and triangular bandages.
Address to the graduates: Col. Charles R. Greenleaf, chief surgeon of the division, assistant surgeon-general United States Army.
Demonstrations by members of the class:
(a) The blanket litter.
(b) Humane restraint.
(c) Artificial respiration; placing the patient in bed.
(d) Lifting and carrying patients.
Awarding certificates, prizes, and chevrons: Maj. Gen. Arthur MacArthur, military governor of the Philippines.
Selection, by Sixth Artillery Band.
Exhibition drill.

It is believed that this company fulfills a useful purpose. That an esprit de corps of no mean grade already exists among its men was shown by an instant and unani-

mous answer to a call for volunteers to nurse plague patients, and the fact that one of the class (Private Archibald D. Wilson) remained on duty for hours with a delirious case of septicemia after receiving what he supposed to be a fatal wound, and which indeed proved to be a badly infected one.

The first class was handicapped by an unavoidable delay in receiving its instruction books, and by an amount of fatigue work that somewhat justified the remark that the principal studies were digging ditches and carrying lumber; yet the progress of the class was fairly satisfactory. The next enters under much more favorable auspices.

Casual camp.—The casual camp is organized as a subpost to the company of instruction and is situated near it on the field of Bagumbayan.

Almost every transport bearing American troops to the Philippines brought enlisted men of the Hospital Corps as well, but until January, 1900, they were assigned to the detachment of the First Reserve Hospital and withdrawn as occasion required. Coincidentally with the establishment of the company of instruction, the camp was organized, and since that time its personnel has fluctuated between 10 and 220. The present number is 74.

The camp receives all recruits, men awaiting assignments, as well as those casually in Manila, and consists of a variable number of hospital tents floored and furnished with cots. The men mess at Hospital No. 3. Water for ordinary purposes is furnished by a hose line from the city mains and drinking water from the sterilizing plant at the hospital. The dry-earth system of pan closets is used.

When the recruit arrives he spells his name to the noncommissioned officer, who checks it and takes an inventory of his Government property, the result of which he records on the card index, affixing his initials. The recruits are then assigned to tents and given copies of the orders for camp.

All require light summer clothing, and this is issued as soon as is practicable. When it is realized that the monthly return of the Hospital Corps personnel usually contains four or five hundred names, the amount of clothing issued may be understood.

A record is taken of any special qualifications the recruit possesses, and his noncommissioned officers are interrogated concerning his efficiency, character, and habits. His name is now placed on the assignment list, and he is recommended for whatever vacancy he appears best qualified to fill. Those men not showing unmistakable evidence of recent and successful vaccination are revaccinated. In practice this amounts to nearly the whole number, and the success obtained proves the wisdom of the operation. It is believed that the notation, "successful," on the descriptive list applies equally well to vaccinia and streptococci infection.

The sick report of the camp is large, the principal causes of admission being venereal and tropical skin diseases, together with intestinal disturbances connected with excesses in a new climate. These recruits proved no exception to the general rules governing their class.

The records required of the camp are a morning report to the commanding officer, sick report, duty roster, card index of enlisted men, and record of special qualifications.

While awaiting assignment the men receive regular instruction in connection with the company, consisting of the daily morning drill and practical work of various kinds. Their stay in camp being of such uncertain length, renders it difficult to attempt really systematic instruction.

When the recruit is assigned to duty, the noncommissioned officer in charge of transportation procures it by boat, rail, or cart; the man is furnished with subsistence and given written directions regarding the place where he is to report. Just before leaving his property is again checked by the acting quartermaster-sergeant, and upon the result, noted on his card index slip, is based the invoice for the property as transferred to his new commanding officer. The descriptive list is invariably mailed within twenty-four hours. Up to this date 774 noncommissioned officers and privates have passed through the camp, and there has been no loss of man or property.

The success which followed the instruction given at these schools has been shown in the special reports, not alone of medical officers, but of many other officers.

Regimental field hospital.—About the last of February, 1901, I notified the Quartermaster-General of my purpose to assemble at certain posts so much of the material of a regimental field hospital (General Orders No. 178, November 8, 1898, from the Headquarters of the Army) as is furnished by the Medical Department, and suggested, in order that these hospitals may be thoroughly efficient and ready for

immediate service, that the Quartermaster-General assemble the necessary camp equipage and transportation, if not already at the posts. The following posts were finally designated, viz:

Department of the East: Fort Columbus, New York Harbor; Plattsburg Barracks, N. Y.; Fort McPherson, Ga.
Department of the Lakes: Fort Sheridan, Ill.; Fort Thomas, Ky.
Department of Dakota: Fort Snelling, Minn.; Fort Meade, S. Dak.
Department of the Missouri: Fort Leavenworth, Kans.; Jefferson Barracks, Mo.
Department of Texas: Fort Sam Houston, Tex.; Fort Clark, Tex.
Department of the Colorado: Fort Logan, Colo.; Fort Douglas, Utah.
Department of the Columbia: Vancouver Barracks, Vancouver, Wash.

The object in the organization of two regimental field hospitals in each department is to have at hand for immediate use by the local military authorities a complete equipment sufficient for the medical needs of a considerable percentage of the command in emergency for active service, field maneuvers, instruction, etc. It is expected that these hospitals will be maintained in the best possible condition and always be in readiness for transfer to any point within the department.

A considerable number of reports have been received in response to a circular letter to chief surgeons, requesting them to ascertain the views of medical officers who may have had active service as to the transportation of the wounded, particularly in regard to details from the line of the Army for this purpose, and to their instruction under paragraph 1608, Army Regulations, 1901. The consensus of opinion seems to be: First, that details of litter bearers from the line have very generally been made; second, that such details were made by the company commander from any men conveniently at hand at the time of the emergency; third, that the work was fairly well done; fourth, that the detail of permanent company bearers is not deemed desirable, but that all men of the line should be so instructed as to be available for bearer work whenever required.

As to the instruction in first aid heretofore given by the company officers under the requirements of this paragraph (1608), it is regarded as being ineffective, and it is suggested that more attention be paid to that part of the regulations which requires the company officers to be thoroughly instructed.

The Hospital Corps is, in the very nature of its work, represented in every engagement; indeed, wherever there may be other soldiers, there, too, are men of this organization. I take pride in the fact that these men have borne themselves creditably under all conditions of service. The following have been especially commended since the date of the last report:[1]

Hospital Steward William A. McGuire.
Hospital Steward E. C. Baldwin.
Hospital Steward Michael Leahy.
Hospital Steward Herbert L. Kneisley, Forty-seventh Infantry, United States Volunteers.
Acting Hospital Steward John R. Kissinger.
Acting Hospital Steward Charles K. Metcalf.
Private Edgar Moore.
Private Ernest H. Stuckert.
Private F. E. White.
Private E. T. Hitch.
Private Louis Palsen.

[1] It is possible that not all are mentioned in this list who are entitled to be, as copies of reports of this character are not invariably furnished this office.

Private Thomas Nielson.
Private John Huff.
Private Dallas Rector.
Private Ambrose L. Van Hise.
Private James N. Lothrop.
Private Clarence A. Chandler.
Private Michael Ilitz.
Private John B. Welsh.
Private Charles W. Abrams.
Private Archibald E. Wilson.
Private Walter H. Phelps.
Private Joseph Fuerst.

During the year the following-named members of the Hospital Corps were given commissions in the line of the Army:

John Jackson.
Edward Lee Raines.
Oliver F. Snyder.
Cleveland Hilson, jr.
Walter C. Jones.
Charles R. Mayo.

Commissions given since July 1, 1901:

Raymond S. Bamberger.
Kneeland S. Snow.

ARMY NURSE CORPS.

With the passage of the army reorganization bill the Nurse Corps became a part of the Medical Department. Provision was made for a Superintendent to be appointed by the Secretary of War, who, under the Surgeon-General, should have charge of the administrative work of the corps. Mrs. Dita H. Kinney was appointed March 15 to that position.

The new law made several other changes in the status of the corps: (1) The nurses no longer serve under contract, but are appointed and discharged by the Surgeon-General with the approval of the Secretary of War. (2) Their payment has passed from the Medical to the Pay Department of the United States Army. (3) The regulations governing admission to the corps are more rigid than formerly, and require candidates to pass satisfactorily certain prescribed mental, physical, moral, and professional examinations. Nurses must give four months' service in the United States to test practically their fitness for army work before they may be assigned to foreign duty. (4) The term of service has been increased from one year to three, the tour of foreign duty from one year to two.

The number of nurses who have applied for admission to Government service since early in 1898 is 7,780. Of these, 1,680 have been employed. The largest number serving at any one time was 1,200, in September, 1898.

The number of nurses in the Army Nurse Corps has decreased during the year. On July 1, 1900, there were in the service 210; on July 1, 1901, 176. Twenty-eight appointments were made during the year. Of these 13 had rendered previous satisfactory service, 15 were new. Sixty-two nurses have been discharged. Of these, 10 are doing civil nursing in the Philippines; 1 has accepted a teacher's position in a school in those islands; the others left the service for various reasons, such as family considerations, disability, etc.

The number of nurses employed in the United States remains prac-

tically the same as last year. On July 1, 1900, there were 60; on July 1, 1901, 59. Their distribution July 1, 1901, was as follows: United States Army General Hospital, Presidio of San Francisco, Cal., 43; Fort Sam Houston, Tex., 2; Fort Bayard, N. Mex., 8; Fort McDowell, Cal., 1; on waiting orders, 5.

The improved condition in Cuba has made only 5 nurses necessary there, distributed among three army hospitals, against 16 one year ago and 76 in 1899.

There are 96 nurses on duty in the Philippines, the majority employed in hospitals in and around Manila; the others are scattered among the larger post hospitals. Six are on transport duty en route to the United States.

On August 4, 1900, 11 nurses from the United States arrived in Tientsin, China, where they remained till the following November. Five were then ordered to Manila and the remaing 6 to hospitals in Pekin, where they remained until May 23, when they too were ordered to the Philippines.

On January 10, 1901, 5 nurses who were serving in Manila were ordered to report for duty to the commanding officer of the new United States hospital at Nagasaki, Japan. One of these has since been discharged; the others are on transport duty en route to the United States, having left the hospital June 3.

The law authorizes a reserve list of nurses. Those only who have given at least six months' entirely satisfactory service are eligible for such appointment. There are at present 37 names on this list and it is being rapidly increased as the records of nurses can be investigated.

The work of the nurses continues to be highly appreciated. Almost without exception the officers commanding hospitals where they are employed have words of commendation for their faithful and intelligent services and high degree of professional skill.

While the presence of female nurses is not considered desirable at post hospitals under ordinary conditions, a special necessity may justify an exceptional ruling in this regard. An outbreak of a severe type of typhoid at Fort Sam Houston, San Antonio, Tex., was the occasion of a request from the commanding officer to the Surgeon-General for 2 female nurses, who were immediately ordered there for duty.

There has been no death among the nurses in service during the year.

MEDICAL AND HOSPITAL SUPPLIES.

The operations of the supply department, fully described in my annual report for the year ending June 30, 1900, have been continued on the same lines during the last year. Medical and hospital supplies in abundance and of good quality, including all modern apparatus and appliances necessary to the proper diagnosis and treatment of diseases and injuries have been promptly furnished for the use of hospitals, military posts, and troops in the field. The three principal home depots at New York, St. Louis, and San Francisco are conveniently located for the purchase, storage, and distribution of supplies, and continue to serve their purpose with economy and efficiency to the department. Experience has shown that, with few exceptions, medicines and medical and hospital property of all kinds can be obtained to the best advantage from the Eastern States, and especially in the

New York market. For this reason the purchase of supplies has been made mainly through the New York depot, from which they are shipped direct to Cuba, Porto Rico, and the Philippines, distributed to posts along the Atlantic coast, or sent to replenish stock at other depots. Stations on the Gulf coast and Middle West are supplied from St. Louis. My efforts to secure more ample accommodations for the storage and preservation of supplies at San Francisco, Cal., have been successful, and the depot in that city is now securely located in a suitable building with sufficient floor space and facilities to meet the large and constant requirements made upon it by military posts on the Western border, in Alaska, Hawaiian Islands, and the Philippines, and by the numerous transports sailing from San Francisco, Portland, and Seattle.

With the improved and rapidly improving conditions in our foreign possessions, and the concentration and reduction of the military forces stationed there, the work of the supply department has been simplified and diminished. The necessity of rush orders and emergency action, unavoidable during hostile operations, is less frequent, and more opportunity for deliberation and the exercise of economy is presented.

Medical supplies left over from the China expedition and the hospital at Nagasaki, Japan, have been saved and shipped to Manila or to San Francisco, and those left by regiments sailing from Manila for the United States have been turned in to the depot there for reissue. It is estimated that the medical and hospital supplies now on hand in the Philippines, issued and in store, will be sufficient, with few exceptions, for the next twelve months. At the subdepots in Havana, Cuba, and at San Juan, P. R., there is also an accumulation of supplies beyond present needs, and it is proposed, after reserving sufficient to meet the requirements of the different military posts there for one year, to ship all remaining serviceable property to the depot in New York.

The subdepot at the Medical Museum building in this city has been in active operation during the year. Its purpose is to provide medical and surgical chests, Hospital Corps pouches, folding furniture, instruments, and other field equipment of new and improved pattern, and to refit old ones. I have devoted much attention to improving the standard of these important appliances, increasing their usefulness and their practical adaptation to the needs of the service, and it is my intention to accumulate a reserve supply sufficient to meet the early requirements of mobilization and keep it in readiness for immediate use.

Ice machines are in operation at seventeen points in connection with the hospital service, and prove of inestimable value in the treatment of the sick and comfort and health of the troops.

A medical supply depot was established last year at Fort St. Michael, Alaska, to which a liberal supply of medicines and hospital supplies were shipped, to be made available for issue to the posts in that Territory which could be reached from that point. This was done in order to save the delay that would be caused by waiting for requisitions and shipping the supplies after the requisitions were received. Supplies have since been sent to this depot to meet such emergencies as might arise and to replenish the stock at depot.

Since my last annual report a corps of contract dental surgeons has been attached to the Medical Department, which made it necessary to provide professional outfits of instruments and appliances required in their field and laboratory work, and to arrange these supplies for

packing in secure and convenient form for transportation and use under the conditions presented in the military service. This has been successfully accomplished, and these equipments are now in the hands of dental surgeons at various stations from Porto Rico to the Philippines.

Under the Act of Congress approved February 2, 1901, all medicines and medical supplies purchased, repairs made or service rendered, except in emergency cases, must be obtained by competition among bidders after advertisement, and I desire to call especial attention to the disadvantages and impracticability of this method as applied to many of the purchases made by the Medical Department, and to urge that in the next appropriation bill a proviso be inserted to the effect that hereafter "advertisement shall not be required for the purchase of medicines and medical supplies or the engagement of services for the Medical Department of the Army, but that the same may be procured in open market at the lowest price obtainable in the manner common among business men." In the Act of February 27, 1893 (27 Stat. L., 485), it was provided, "That hereafter so much of section 3709, Revised Statutes, as requires advertisement before purchase shall not apply to the purchase of medicines and medical supplies." The proviso of 1893 was deemed by the accounting officers of the Treasury to be permanent legislation, and was held to be operative until the passage of the army appropriation Act of March 2, 1901. The latter provided that all laws inconsistent therewith were thereby repealed; and the Comptroller of the Treasury thereupon held that the proviso of 1893 was repealed, regarding the same as inconsistent with the second proviso under the appropriation for regular supplies, Quartermaster's Department, in the law of March 2, 1901. On account of their peculiar character it is quite often impracticable to fix in advance a standard upon which intelligent competition for medicines and medical supplies can be based. For example, there is no established standard for many drugs, medicines, and chemicals. Different bids for articles of the same name may be for articles of widely different quality, value, and usefulness. The bids, accordingly, are not comparable, and there is no genuine competition. The articles required must eventually be selected not with an eye to the lowest bid, but according to their quality and composition. These factors can be ascertained in a large proportion of cases only by chemical analysis. Moreover, many articles of this class, such as vaccine virus and diphtheria antitoxin, soon deteriorate. They can not, therefore, be kept in stock, but must be obtained at short intervals to meet the recurring necessities of the service. The expense, delay, and inconvenience of soliciting bids and executing the formal papers connected therewith for such frequently recurring purchases will, as a rule, overbalance any advantage of prices derived therefrom, even when dealers can be persuaded to go to the trouble and submit to the formalities incident to this method. Again, articles of hospital furniture or equipment and surgical instruments are for the most part of special construction or design, and often are not dealt in by the trade generally, but only by some one maker. Moreover, different makes of the same article or different articles of the same name have very different values, according to the skill with which they are made and the material employed in making them. The excellence of particular makes has been demonstrated to the Medical Department by many years of experience, and the Government is best served by the

choice of articles of tested fitness. The only practical test in many cases must be actual service in ward or field. To require purchases from the lowest bidder under competition would, even when every reasonable care is taken, often result in the purchase of articles which, when exposed to the test of actual service, would prove to be unsatisfactory. Certain kinds of service also can be engaged to better advantage without advertising than under the formalities of competition. There is, for example, a great amount of hospital linen to be laundered in the course of a year, varying from time to time with the exigencies of the service. If the amount to be done could be fairly approximated, and were all to be done at one post or hospital, or even a few, the soliciting of bids and letting of contracts thereunder would be a simple matter. But the work must be done at a great number of places, often changing with the movements of the Army, and at frequent intervals. When done by individual launderers, as at detached posts, the work is now regarded as "personal service" under section 3709, Revised Statutes, for which no advertising is required. If done, however, by steam laundries, it is doubtful whether the exception would hold good, but it would entail great labor and delay to obtain bids and let the contracts for the large number of separate commands, hospitals, and transports. The repair of surgical instruments and hospital equipment, which frequently can only be done in a satisfactory manner by the firms and corporations engaged in their manufacture, can also be engaged more expeditiously and to better advantage by direct application to such firms and corporations than by soliciting bids. No substantial economy can be effected by the effort to obtain competition in such cases which will offset the enormous amount of paper work and administrative circumlocution incident thereto. I therefore earnestly recommend that the Medical Department be again enabled, as under the law prior to March 2, 1901, to go into open market at its discretion, and to that end urge the enactment of the proviso proposed above. This proviso, while it differs in words from the law of 1893, is designed to have the same effect. The new phraseology is, however, preferred as better adapted to accomplish that result, having in view the numerous provisions of law modifying section 3709, Revised Statutes, which have from time to time been enacted. Under the proposed law the Medical Department will, of course, be free to advertise for competition when that course is thought to be in the public interest.

MEDICAL INSPECTIONS.

I would again respectfully renew my recommendation that the regulation, which has for several years practically interdicted systematic inspection by chief surgeons, and which regulation is continued in force in paragraph 1671, Army Regulations, 1901, be modified to read "Chief surgeons will visit each post in their departments at least once a year," etc. No argument in support of this would seem to be necessary. The work of the Medical Department is primarily with men and secondarily with materials. The men are the invalids, who represent a considerable percentage of the line of the Army, whose condition and wants can be intelligently appreciated only by an educated physician, and the personnel, the sanitary soldier, who cares for them. In other services the necessity for such inspection is admitted, and met by a corps of medical inspectors. Indeed, this was the case in

our service during the war of 1861–1865. But since the promulgation of this regulation, which includes the period during and since the Spanish-American war, such medical inspections have been made irrespective instead of because of regulations.

EXHIBIT OF THE MEDICAL DEPARTMENT AT THE PAN-AMERICAN EXPOSITION, BUFFALO, N. Y.

In response to the request of the authorities of the Pan-American Exposition, Buffalo, N. Y., I recommended to the Secretary of War that the Medical Department place on exhibition at the exposition a fully equipped field hospital, having attached thereto a Hospital Corps personnel of sufficient size to furnish attendants and guards for the exhibit and to give exhibition drills in first-aid work and transportation of the wounded, believing that this exposition afforded an excellent opportunity for acquainting the general public with the equipment of the Medical Department, its methods and resources, and with the efficiency of the Hospital Corps. It was also requested by the exposition authorities that this Department make an indoor display in the Government building of material drawn from the Army Medical Museum and the library of the Surgeon-General's Office, but as the floor space available for this purpose amounted to but 400 square feet I was unwilling to recommend such an exhibit, since the latter, from the insufficient space, could not be made of a size and scope commensurate with the dignity and resources of this Department.

The exhibit, which was in charge of Capt. E. L. Munson, assistant surgeon, United States Army, consisted of a brigade field hospital of 100 beds, and was excellently located on a plot of ground immediately south of the Government building, very accessible to visitors and of sufficient size not only to contain the hospital tentage without crowding but also furnish an adjoining space suitable for drill purposes. The hospital was fully equipped in all its details according to the provisions of the latest supply table, the purpose being to leave nothing to the imagination of visitors, the majority of whom would be unfamiliar with military matters, but to demonstrate the equipment of the Medical Department in respect to the brigade-hospital unit in quantity, size, and capacity, as well as in form, variety, and quality. The exhibit was peculiarly unique and attractive, as the equipment displayed was almost wholly composed of articles lately incorporated in the supply table of this Department as a result of the recommendations of a board of medical officers who were engaged for nearly two years in the improvement of the hospital equipment and supplies. These articles had never previously been brought together for consideration as a unit in the field hospital, and their comprehensiveness, compactness, portability, and practical efficiency for the purpose indicated, as demonstrated in the exhibit made at the Pan-American Exposition, give occasion for much congratulation. Probably no such modern and complete equipment for the care of the sick and wounded in the field could be shown at the present time by any other army in the world. The exhibit has been inspected by a large number of officers of foreign services, who have personally and in their official reports given it the highest praise.

The hospital wards of the exhibit were arranged in the form of a cross, one arm of which ended directly at the steps of the arcade between the Fisheries and the main Government building, so as to serve as the main entrance and afford a very attractive view of the interior of the hospital to passing visitors. From the shape of the ground it was found possible to pitch but 12 ward tents, having a capacity

PARTIAL FRONT VIEW OF UNITED STATES ARMY BRIGADE FIELD HOSPITAL, PAN-AMERICAN EXPOSITION, BUFFALO, N. Y.

of 72 beds. The covered space at the intersection of the wards contained a large collection of radiographs and photographs illustrating the actual work of the Medical Department in the field. Between the arms of the cross were located the dispensary, office, surgical, mess, store, and kitchen tents, the line of tents of the Hospital Corps detachment being placed on the right flank of the hospital, with a graveled parade ground intervening.

The plot occupied by the hospital was sodded, except where graveled walks were necessary for communication, and the attractiveness of the exhibit as a whole was such as to elicit much commendation from visitors.

The morning and afternoon drills of the Hospital Corps detachment, the latter consisting of 3 noncommissioned officers and 20 privates, have proved an extremely interesting and instructive feature of the exhibit, attracting large crowds of visitors and exciting much favorable comment. The conduct of these men has been excellent, and their soldierly appearance and technical ability reflect much credit on the corps they have so well represented.

The number of visitors who have inspected the field hospital and witnessed the exhibition drills of the Hospital Corps is very great and my expectation that this exhibit would prove an attractive and interesting as well as instructive feature of the exposition has been amply justified. The character of the exhibit is such as would naturally attract military and medical men, and in addition the recent war with Spain and hostilities in the Philippines and in China have aroused a general interest in military matters. A large proportion of visitors at the exposition have had relatives or friends in the regular or volunteer forces, and these, particularly the women visitors, have shown much interest in the methods and appliances by which sick and wounded soldiers are cared for by this Department in the field. As a means of educating the popular mind with respect to the efficiency of the Medical Department this exhibit has thus been of very great value. Records of the attendance at the exhibit are being preserved and these show that the number of visitors inspecting the field hospital and attending the drills of the Hospital Corps detachment up to August 1 was probably equal to about 20 per cent of the total paid admissions to the exposition. During the first three months after the opening of the latter it is probable that about 500,000 persons inspected the equipment of the hospital and witnessed the exhibition drills, and with the increased attendance during the latter months of the exposition it is probable that nearly 1,500,000 persons will, by this means, have been educated to a better knowledge of the resources and workings of the Medical Department.

Since the foregoing paragraphs were written the preliminary statement of awards has been received, and is as follows:

The Medical Department of the Army has established immediately south of the Government building a model brigade field hospital. Seldom has the public been able to inspect such an exhibit. It is especially interesting since it represents the new equipment of the Medical Department in the field—scarcely an important article of which but has been adopted since the outbreak of the war with Spain and has never been shown previously.

The detail of enlisted Hospital Corps men give daily an exhibition drill in first aid to the wounded, litter drill, demonstrations of the various means of transporting the wounded, tent pitching, and hospital establishment. The drills are very popular, and in connection with them the hospital forms a most complete and creditable exhibit of the medical service of the Army.

* * * * * * *

We recommend the following for recognition: * * * Medical Department, United States Army, model brigade field-hospital drills.

RECRUITING.

The total number of men examined for enlistment in the Regular Army during the year 1900 was 39,916, of whom 38,115 were white and 1,801 were colored. The number accepted was 22,479, or 563.16 out of every thousand examined. The ratio of accepted men was 558.68 for the white and 657.97 for the colored. White men to the number of 75.77 and colored men to that of 43.86 per thousand declined enlistment. The rate of rejection on primary examination was 365.55 among the white and 298.17 among the colored candidates, giving a mean of 362.51. These statistics do not include among the rejections the cases of applicants who were so obviously unfit for the military service that they were rejected by the recruiting officer without being subjected to a medical examination.

The ratio of accepted men during the past year was considerably smaller than during the years immediately preceding. In 1897, a year of peace, the ratio was 702.19 out of every thousand examined. In 1898 during the active recruiting to increase the numerical strength of the Army the accepted men numbered 770.47 per thousand examined, but in 1899 the ratio decreased to 681.24 and during the past year to 563.16, showing evidently that greater care is exercised in the selection of men for the service.

Of every thousand of the accepted men 854.18 were natives of the United States, 39.01 were born in Germany, 33.94 in Ireland, 14.32 in England, 13.43 in Canada, 7.70 in Sweden, 5.69 in Austria, 4.94 in Russia, the remainder in various other countries. The war period, 1898–99, lessened very materially the ratio of foreign-born men enlisted for service. In 1897 the foreign born constituted 257.53 per thousand of the accepted recruits. In 1898 this ratio was reduced to 153.98, in 1899 to 144.39, and last year to 145.82.

Of every thousand men examined during the past year 89.42 were rejected on account of imperfect physique, including overheight, underheight, overweight, and underweight, 56.04 for diseases of the eye, 48.90 for diseases of the circulatory system, 34.02 for diseases of the genito-urinary system, 30.56 for diseases of the digestive system, 24.28 for venereal diseases, 13.48 for hernia, while 11.65 were rejected as generally unfit or undesirable, 8.40 for diseases of the integument and subcutaneous connective tissues, 5.16 on account of bad or doubtful character, 4.38 as unclassified, 4.36 as minors, 4.13 for diseases of the muscles, bones, and joints, while only 2.73 were rejected on account of illiteracy, imperfect knowledge of the English language, or mental insufficiency.

Number of white and colored applicants for enlistment examined physically during the year 1900, with the number accepted, rejected on primary examination, and declined, with ratios per thousand.

	White.		Colored.		Total.	
	Number.	Ratio per 1,000 examined.	Number.	Ratio per 1,000 examined.	Number.	Ratio per 1,000 examined.
Examined	38,115	1,000	1,801	1,000	39,916	1,000
Accepted	21,294	558.68	1,185	657.97	22,479	563.16
Rejected	13,933	365.55	537	298.17	14,470	362.51
Declined	2,888	75.77	79	43.86	2,967	74.33

In addition to the foregoing, 35 Indians were examined, of whom 25 were enlisted as scouts and 6 for regular service; 4 rejected.

Nativity of white and colored recruits accepted during the year 1900, with ratios per thousand accepted.

Nativity.	White.		Colored.		Total.	
	Number.	Ratio per 1,000 accepted.	Number.	Ratio per 1,000 accepted.	Number.	Ratio per 1,000 accepted.
United States	18,025	801.86	1,176	52.32	19,201	854.18
England	322	14.32			322	14.32
Scotland	77	3.43			77	3.43
Wales	17	.76			17	.76
Ireland	763	33.94			763	33.94
Canada	299	13.30	3	0.13	302	13.43
Other British	23	1.02	2	.09	25	1.11
France	29	1.29			29	1.29
Belgium	5	.22			5	.22
Holland	21	.93			21	.93
Denmark	77	3.43			77	3.43
Norway	83	3.69			83	3.69
Sweden	173	7.70			173	7.70
Germany	877	39.01			877	39.01
Switzerland	66	2.94			66	2.94
Austria	128	5.69			128	5.69
Bohemia	23	1.02			23	1.02
Hungary	20	.89			20	.89
Poland	22	.98			22	.98
Russia	111	4.94			111	4.94
Finland	8	.36			8	.36
Italy	40	1.78			40	1.78
Others	85	3.78	4	.18	89	3.96
Total foreign	3,269	145.42	9	.40	3,278	145.82
Grand total	21,294	947.28	1,185	52.72	22,479	1,000

Causes of rejection among 39,916 candidates for enlistment examined during the year 1900, with ratios per thousand examined.

Number examined	White, 38,115.		Colored, 1,801.		Total, 39,916.	
Causes of rejection.	Number rejected.	Ratio per 1,000.	Number rejected.	Ratio per 1,000.	Number rejected.	Ratio per 1,000.
Venereal diseases	872	22.88	97	53.86	969	24.28
Other infectious diseases	120	3.15	9	5.00	129	3.23
Diseases of the nutrition, general	42	1.10	4	2.22	46	1.15
Diseases of the nervous system	130	3.41	3	1.67	133	3.33
Diseases of the digestive system	1,195	31.35	25	13.88	1,220	30.56
Diseases of the circulatory system	1,910	50.11	42	23.32	1,952	48.90
Diseases of the respiratory organs	123	3.23	5	2.78	128	3.21
Diseases of the genito-urinary system	1,321	34.66	37	20.54	1,358	34.02
Diseases of the lymphatic system and ductless glands	34	.89	3	1.67	37	.93
Diseases of the muscles, bones, and joints	161	4.22	4	2.22	165	4.13
Diseases of the integument and subcutaneous connective tissue	327	8.58	8	4.44	335	8.40
Diseases of the eye	2,176	57.09	61	33.87	2,237	56.04
Diseases of the ear	196	5.17	6	3.33	202	5.06
Diseases of the nose	39	1.03	1	.56	40	1.00
Hernia	512	13.43	26	14.44	538	13.48
Other injuries	141	3.70	3	1.67	144	3.61
Overheight	2	.05	1	.56	3	.08
Underheight	181	4.75	11	6.11	192	4.81
Overweight and obesity	41	1.08			41	1.03
Underweight	805	21.12	20	11.10	825	20.67
Imperfect physique	2,418	63.44	90	49.97	2,508	62.83
Mental insufficiency	35	.92	1	.56	36	.90
Over age	10	.26	1	.56	11	.28
Minor	169	4.43	5	2.78	174	4.36
Married or having dependent relatives	76	1.99	7	3.89	83	2.08
Illiteracy	55	1.44	3	1.67	58	1.45
Imperfect knowledge of English	15	.39			15	.38
Reenlistment disapproved for various reasons	10	.26	7	3.89	17	.43
Character bad or doubtful	200	5.25	6	3.33	206	5.16
Reference, none or unsatisfactory	15	.39	2	1.11	17	.43
Aliens	3	.08			3	.08
General unfitness and undesirable	431	11.31	34	18.88	465	11.65
No vacancies	6	.16	2	1.11	8	.20
Unclassified	162	4.25	13	7.22	175	4.38
Total	13,933	365.55	537	298.17	14,470	362.51

VARICOCELE IN RECRUITS.

In view of the frequency of varicocele among recruits, of the infrequency of disability arising from this condition of the spermatic veins, and of the highly satisfactory results obtained by aseptic surgical intervention for its radical cure in cases in which complaint was made of an associated disability, the following circular was issued by me:

CIRCULAR No. 3.

WAR DEPARTMENT,
SURGEON-GENERAL'S OFFICE,
Washington, February 27, 1901.

The attention of medical officers is invited to the accompanying papers relating to varicocele and its cure by surgical intervention. The rule laid down in Tripler's Manual should govern medical officers in the examination of recruits, viz: That a candidate for enlistment should be rejected if he has a varicocele which is larger than the sound testicle. If, however, upon a subsequent examination, after enlistment, a recruit is found to have a varicocele as large as or larger than the sound testicle and complaint is made of disability arising from it, this should not be considered a cause for discharge, but for surgical treatment.

In this connection attention is invited to the following decision published in Circular No. 11, Adjutant-General's Office, Washington, December 10, 1884:

"Except in case of a capital operation involving the risk of life, a soldier can not refuse to submit to medical treatment or surgical operation without subjecting himself to trial by court-martial for willfully avoiding treatment the purpose of which is to enable him to perform the duties for which he enlisted."

REPORT OF LIEUT. COL. A. C. GIRARD, DEPUTY SURGEON-GENERAL, UNITED STATES ARMY, GENERAL HOSPITAL, PRESIDIO OF SAN FRANCISCO, CAL., JANUARY 11, 1901.

The pubes are carefully shaved the day before operation; a soap poultice is applied and the patient kept in bed. Next morning, after the patient has been etherized, the pubes are scrubbed with soft soap and warm sterilized water, washed with warm sterilized water, then with alcohol, and then wiped dry. The finger is introduced by the spermatic cord into the inguinal canal until the external ring is felt. An incision is then made, corresponding to the axis of the canal, 1 inch long, the upper end ending over the external inguinal ring. Superficial and deep fasciæ are divided with angular scissors, preferably over a Kocher director. The vessels of the cord then come into view. The finger is passed under the cord by a little blunt separation and the cord is raised out of the wound. The spermatic duct and artery are returned as soon as possible into the bottom of the wound to prevent accidental injury. A sound vein selected for preservation to return the blood from the testicle is carefully separated from the strand of veins and carried alongside the duct. The veins are then dissected from the connecting tissue for a distance of about 2 inches, ligated with small-sized catgut at the end of these dissections, and cut off between the ligatures which are left 3 or 4 inches long. The ligatures are then tied together, the upper and lower ends of the veins being approximated, and for further safety threaded to needles and the ends united by stitches and finally anchored to the external pillar of the ring. The deep and superficial fasciæ are then carefully and separately united with a continued catgut suture, and the skin by a subcuticular suture of silkworm gut.

After a little practice this operation takes only a few minutes. The advantage over the Volckmann operation is that the seat of operation can be made absolutely sterile, which is almost impossible in the scrotum; that the scrotal tissue, being of a loose character and readily infiltrated, becomes a nidus for infection; that the scrotal scar will always be more or less tender, inconvenient and unsightly, while the suprapubic scar practically disappears, is invisible and not tender.

Sixteen cases have so far been operated on at this hospital. The men all recovered without any drawback and were returned to duty. Three of the men belong to the Hospital Corps and are now on duty at this hospital. They do not feel the slightest inconvenience from the operation, consider themselves practically cured, and there is nothing visible to show that they have ever had an operation performed. Special reports were transmitted in each case at the end of the month during which the operations were performed.

Below is a list of men showing hospital number, name, organization, and date of operation.[1]

[1] It is not considered necessary to publish this list. The first reported case was operated on October 10, 1899, the last November 14, 1900.

The idea of this operation was first received from Dr. C. R. Krone, of Berkeley, Cal., although I am informed by Colonel Forwood that this had been his method of operating at the United States Soldiers' Home, Washington, D. C.

The operation is easy and, if necessary, the patient might be discharged from hospital in two or three days, while scrotal operations, as a rule, take longer to heal.

REPORT OF MAJ. J. M. BANISTER, SURGEON, UNITED STATES ARMY, UNITED STATES MILITARY ACADEMY, WEST POINT, N. Y., JANUARY, 12, 1901.

All surgeons who have been in practice a little more than a decade have seen a great revolution in the operative technic for the radical cure of varicocele. Before the advent of modern aseptic methods our attempts at the cure of this condition were bungling, imperfect, and unscientific, and as a consequence our results were unsatisfactory and uncertain. Such procedures as the amputation of the redundant scrotum; the subcutaneous passage of a silver wire around the veins, or presumably around the veins, and the fastening of the ends of the wire to a button or yoke, applied at the point of their exit from the scrotum, with a daily tightening of the wire loop until the tissues in its grasp were cut through; the subcutaneous use of a silk ligature around the veins, which was tied tightly and the knot pushed into the scrotum were recommended and practiced. All these methods I have tried, but I am free to confess that my results were not satisfactory, and in those days I never attempted the cure of varicocele with the slightest feeling of confidence. Now, thanks to modern aseptic technic, the skilled surgeon no longer works blindly, but by the open method exposes the enlarged veins, ligates and excises them to the needed extent, closes the wound, and confidently expects first union and a perfect cure. The technic which I have pursued for some years in the surgical treatment of varicocele will now be described, but I wish in advance to disclaim any originality in this matter, as in working in this line I have simply been following in the steps of Professors Halsted and Bloodgood, of Johns Hopkins University.

The patient is prepared as for any other aseptic operation requiring the administration of an anæsthetic. The day before the operation he is placed upon a liquid diet and given a saline purge. Operating, as I do, almost invariably in the afternoon for reasons of convenience, the patient early on the morning of the operation is given a cup of broth, which is to be his only food that day. He is then required to take a bath, the hair on the pubes and scrotum is shaved, and a wet bichloride dressing applied. After the patient has been etherized and placed upon the operating table the antiseptic dressing is removed, and the region of the operation, including the scrotum, is thoroughly scrubbed, first with soap and water, then with ether, and finally with a solution of bichloride of mercury, 1 to 1000. The patient is then covered with sterilized towels, the site of the proposed wound in the groin only being uncovered. The hands and arms of the surgeons and assistants having been sterilized and all those assisting in any capacity being dressed in freshly sterilized linen gowns and trousers, the surgeon commences the incision just above the spine of the pubic bone and carries it upwards and outwards for about 1½ or 2 inches, somewhat parallel to Poupart's ligament. I seldom make a longer incision than the one first designated. After dividing the skin I grasp the underlying layers of fascia with a mouse-toothed forceps in one hand, and with a dull dissector in the other tear through the layers until the external abdominal ring is exposed and the tunica propria of the cord comes into view, the layers of fascia being exposed throughout the whole exent of the wound. During this procedure the wound is held open by means of two small retractors. When the cord contained in its proper sheath has been clearly exposed the sheath is seized with the forceps and divided longitudinally, when the large veins constituting the anterior portion of the cord become visible. The vas deferens and other structures of the cord behind this group of veins must be interfered with as little as possible. This anterior group of veins should now be grasped between the fingers at the lower extremity of the wound and pulled upwards so that a portion of their extent contained in the scrotum near the upper termination of the pampiniform plexus may be brought into plain view in the wound. This can be done with the greatest ease and with the gentlest traction. What is desired by this maneuver is the drawing up of the enlarged and tortuous portion of the veins from the scrotum into the wound for ligation and excision. Having brought the veins to be treated into view, they are held by a pair of forceps in the hands of an assistant or upon a blunt hook passed under them, and an aseptic silk or kangaroo ligature is passed around them en masse at as low a point as desired, tied tightly and one end of the ligature cut off, the other end being, for the time, left uncut. The same veins are similarly treated at a point about 1¼ inches higher up, and the portion included between the ligatures excised and removed. The uncut ends of the ligatures are now tied, thus drawing together the severed ends of the veins, not with the object of securing end to end union, which would be impossible, but with the expectation that the testicle will be temporarily

held up until adhesion shall have formed. After being thus treated, the veins are pushed down into the scrotum, where the ligatures can be easily felt between the thumb and finger. The wound is then closed either by interrupted sutures of silkworm gut or by a subcuticular continuous suture of kangaroo tendon, which latter is now my favorite method of closing aseptic skin wounds. The wound is dressed with dry aseptic gauze and cotton, and the whole held in place by a gauze spica bandage. The testicle, which is not covered by the bandage, is supported during the period of confinement to bed, and a suspensory bandage is ordered for constant use for a few months after complete recovery. The wound is redressed in one week, when the sutures are removed if silkworm gut has been used. The patient is allowed to sit up in ten days. For a time there will be a swelling of the obliterated veins below the ligature, but this rapidly subsides, and soon only a small lump can be detected in the scrotum.

Report of cases.—I have operated quite often in the manner described, having at times performed two varicocele operations at one sitting. The complete records of my operations performed elsewhere are not available, but I have the records of 16 operations for the radical cure of varicocele performed at West Point, N. Y., which, with the exception of case 4, are almost identical in results with those previously performed. In all my cases operated upon before my coming to West Point there was first union, a complete cure of the varicocele, and no atrophy of the testicle. This much I know, although I have not the names of the patients nor the histories of the cases at hand. The histories of the 16 cases operated upon at West Point will now be given:

Case 1.—Cadet C. B. C. Operation by high incision January 10, 1899. Result: Union per primam; no epididymitis; returned to duty with a perfect cure February 1, 1899. This cadet left West Point February 15, 1899, in consequence of graduation and is now an officer on duty in the Philippines.

Case 2.—Cadet F. P. A. Varicocele, left side. Operation by high incision March 24, 1899. Result: Union per primam; no epididymitis; returned to duty with a perfect cure May 4, 1899. Graduated in 1900 and is now an officer of the Army. This cadet remained for over a year at West Point after the operation and never had the least trouble up to the time of his departure.

Case 3.—Private R. Van V., Army service detachment. Operation by high incision performed May 29, 1899, in my presence by First Lieut. D. F. Duval, assistant surgeon, United States Army. Result: The wound healed by first union; no epididymitis. I have just examined this man, who is still on duty at West Point, and find the testicle unaffected. There has resulted, however, a small hydrocele, which gives no trouble of consequence.

Case 4.—Cadet T. N. G. This cadet was admitted to the Academy in June, 1899, with a varicocele of medium size. His military duties in camp caused the veins to enlarge very rapidly, and by August 11 the varicocele had attained a size that made an operation necessary to enable him to remain at the Academy. On the date mentioned I operated in accordance with the method described. The patient did well, the wound healed per primam, and there was no epididymitis. During convalescence the testicle was bruised several times, causing a little swelling of the gland. This cadet was returned to duty September 2, 1899. A little while after leaving the hospital he received a contusion of the left testicle in the gymnasium, which caused a decided swelling of the gland, though the injury did not give rise to an acute orchitis. I have just examined this cadet, sixteen months after the operation, and find a small hydrocele present and the testicle on the operated side somewhat larger than the other. He states, however, that he has never had the least trouble referable to the testicle or scrotum, and that he performs his military duties and exercises with ease, a condition in marked contrast to that existing prior to the operation.

Case 5.—Cadet G. R. G. This cadet was admitted to the Academy in June, 1899, with a varicocele of medium size, which, after about two months of duty in camp, became increased in size to a degree which prevented him from performing his military duties. On August 14, 1899, I operated by the method described. The wound healed per primam; there was no epididymitis; no swelling of the testicle, and in fact not an untoward sympton. He was returned to duty September 3 with an absolutely perfect cure. I have examined this cadet within the last few days, sixteen months after the operation, and find the result perfect. There is no atrophy of the testicle, no enlargement of the veins, nor any evidence that there ever has been any trouble of any kind.

Case 6.—Cadet R. C. T. This cadet was admitted to the Academy in June, 1899, with a varicocele of medium size, which rapidly enlarged in consequence of the military duties of camp until it became necessary to operate. I performed the operation on August 16, 1899. This cadet made a perfect recovery, with no complication, and was returned to duty September 3, 1899. I have recently examined this cadet, sixteen months after the operation, and find the result perfect.

Case 7.—Cadet B. B. McC. Like the three preceding cases, this cadet was admitted to the Academy in June, 1899, with a moderately sized varicocele, which rapidly increased in consequence of the duties required of him in camp until an operation became necessary. On August 19, 1899, I performed the operation as described. A perfect recovery ensued. There was no sign of any complication during convalescence. This cadet was returned to duty September 3, 1899, with a perfect cure. I have just examined this cadet, sixteen months after the operation, and find the result absolutely perfect.

Case 8.—Cadet J. P. R. Varicocele, right side. Before coming to the Academy this cadet had been operated on by a civilian surgeon for varicocele on the left side. The incision used at that time was through the scrotum. Adhesions had formed between the cord and the scrotal wound, which caused the patient inconvenience, and singularly there had resulted a tendency to sweating on this side, which would be wet with perspiration, while the other side remained dry. A troublesome varicocele having developed on the right side during service at the Academy, this cadet applied to me for operation. I performed my usual operation on October 31, 1899, which was followed by no complication, and resulted in a perfect cure. The result of the high operation stood in flattering contrast to that through the scrotal incision. This cadet was returned to duty November 28, 1899, graduated in June, 1900, and is now an officer of the Army.

Case 9.—Cadet N. C. M. This cadet applied to me in November, 1899, for relief from a troublesome varicocele, and I operated upon him November 15, 1899. The wound healed by first union, the cadet recovering without a complication and with a perfect cure. This cadet was returned to duty December 26, 1899, and graduated in June, 1900, being now an officer of the Army.

Case 10.—Private J. S. C. C., Company E, Battalion of Engineers. Varicocele, left side. The high operation was performed by my assistant, First Lieut. F. M. Kemp, assistant surgeon, United States Army, January 11, 1900. The wound healed per primam and a perfect recovery, without a complication, resulted. This soldier was returned to duty February 14, 1900, and is now on duty with his company in the Philippines.

Case 11.—Cadet V. La S. R. On January 16, 1900, I operated upon this cadet in accordance with my usual technic. He recovered without a complication and was returned to duty on February 17, 1900, with a perfect result. In June, 1900, he left the Academy in consequence of graduation and is now an officer of the Army.

Case 12.—Private A. J., detachment of cavalry. Operated upon by me February 5, 1900. This soldier was returned to duty February 21, 1900. I have examined him within the last few days, eleven months after my operation, and find the final result absolutely perfect. There is no evidence that there has ever been any abnormity in this case.

Case 13.—Cadet F. O. W. On March 18, 1900, the operation by the high incision was performed in this case. The wound healed by first union; there was no epididymitis nor swelling of the testicle, and the cadet was returned to duty cured May 19, 1900. He graduated in June, 1900, and is now an officer of the Army.

Case 14.—Cadet J. W. W. Operation performed March 8, 1900. The case progressed without a complication and the cadet was returned to duty with a perfect cure on April 21, 1900. He graduated in June, 1900, and is now an officer of the Army.

Case 15.—Cadet A. P. S. H. Operation performed March 20, 1900. There was not the slightest complication in this case, the wound healing per primam and the patient returning to duty April 18, 1900, with a perfect cure. He graduated in June, 1900, and is now an officer of the Army.

Case 16.—Private C. McL., detachment of cavalry. Varicocele, left side. Operation in accordance with the writer's technic was performed by First Lieut. F. M. Kemp, assistant surgeon, United States Army, April 10, 1900. The wound healed per primam, there was no epididymitis or other complications and a perfect cure resulted. The patient was returned to duty May 19, 1900. I have within the last few days examined this soldier and find the result absolutely perfect.

Résumé.—In reviewing the histories just given it will be seen that in the 16 cases recorded there has been first union in every case and that there has been no epididymitis as an immediate result of the operation nor any instance of atrophy of the testicle as a final sequence. A perfect result was obtained in 14 out of the 16 operations recorded. In one case, No. 4, the testicle on the affected side is at the present time, sixteen months after the operation, found to be somewhat larger than its fellow gland and a small hydrocele is discoverable. The patient, however, considers his cure perfect. Another case, No. 3, shows a moderate hydrocele, which is of no practical importance as it does not interfere with the performance of the soldier's duty.

General considerations.—Among my own cases and those of my former junior colleagues, Assistant Surgeons W. F. Lippitt, John H. Stone, and Basil H. Dutcher,

which were subjected to operation before my coming to West Point, and which are not included in the histories given above, I have never known of a single case that did not result in a perfect cure. In 1897 I saw one case, which has just been operated upon by one of my colleagues mentioned, in which the scrotum was distended with blood, presumably from a slipping of the lower ligature. This was remedied by the surgeon who performed the first operation, and I was informed that an excellent result had been secured.

It can be appreciated, therefore, that when carefully performed the operation for varicocele is one of the most successful of surgical procedures, and that its possible disadvantages are so slight as to justify the surgeon in ignoring them when called upon to decide as to the advisability of operating in a given case. The high incision with the ligation and excision of the veins is without question the ideal operation for varicocele. It has decided advantages over the incision through the scrotum with few of the disadvantages of the latter.

The advantages of the high incision are:—

1. The scrotal portion of the enlarged veins can be reached with the greatest ease through a small incision placed at the point of election.

2. The results of the operation through the high incision are better than those obtained by means of the incision through the scrotum.

Dr. Bloodgood's statistics are as follows:

"Incision in the scrotum, 16 cases. Ultimate result in these cases: Lost track of since operation, 10 cases; testicle normal, 4 cases; small hydrocele, testicle normal, 1 case; complete atrophy of the testicle, 1 case.

"Incision in the groin, 29 cases. Ultimate result in these cases: Lost track of, or recent cases, 12 cases; no atrophy of testicle, 12 cases; hydrocele, 5 cases; atrophy of testicle, 0 case. Healing of wounds, scrotal incision per primam, 12 cases; suppuration, 4 cases. Healing of wounds, incision of groin, per primam, 27 cases; suppuration, 2 cases."[1]

3. First union can almost certainly be counted upon in the high incision. In my personal experience I have invariably secured union per primam in my varicocele wounds when located in the groin.

The disadvantages of the incision through the wall of the scrotum are the following:

1. The difficulty of securing perfect asepsis, owing to the locality of the wound.

2. The tendency of the contractions of the dartos to drag on the wound, causing gaping, thus opening the way for pyogenic infection.

3. Greater liability to atrophy of the testicle.

Referring again to my own statistics, I can say that I have never seen a case of epididymitis or atrophy of the testicle resulting from a varicocele operation performed by me. My results have been absolutely perfect, except in case 4, where traumatism occurred during and after convalescence, and in the case cited the relief from former inconvenience is at the present time so great that the patient considers himself cured.

I conclude this paper by advancing the following propositions:

1. The operation for the radical cure of varicocele by the high incision, with ligation and excision of the veins, is one of the most successful of surgical procedures.

2. The operation is without risk to life in the case of a patient without disease of vital organs.

3. That it is well adapted to the military service.

4. That no soldier otherwise sound should be discharged from service on account of varicocele.

5. That it should be the duty of the medical department of the Army to cure these cases, compelling compliance on the part of the soldier where objection is urged.

REPORT OF CAPT. W. C. BORDEN, ASSISTANT SURGEON, UNITED STATES ARMY, UNITED STATES GENERAL HOSPITAL, WASHINGTON BARRACKS, D. C., FEBRUARY 9, 1901.

I have operated for varicocele in twenty-two cases, and have used two methods—subcutaneous ligation and excision. The cases by subcutaneous ligation were thirteen in number and were done several years ago. This method I no longer consider worthy of consideration, as it has been entirely superseded by the more accurate and satisfactory method of operation by excision.

Operation by the open method with excision of the veins.—In operating by this method one of two incisions may be practiced—above the pubes over the external inguinal

[1] See Dr. Joseph C. Bloodgood's paper in "The Johns Hopkins Hospital Reports, Vol. VII," page 350.

ring or through the front of the scrotum. I have used both incisions, having operated about an equal number of times by each, and believe the suprapubic method to be by far the safer for general work; but in certain cases, where the scrotum is quite long and relaxed, I prefer the incision through the scrotum when I am absolutely sure of my asepsis. The operation for varicocele is one which requires extreme care in the aseptic technic, and this is particularly the case if the operation is done through the scrotum, as the laxity of the tissues, the deep rugæ of the skin, and the deep sebaceous glands in this region tend to harbor infection, which if it occurs is invariably followed by prolonged suppuration and sinuses which have no tendency to heal, thus necessitating a secondary operation. Aside from the prolonged suppuration which follows infection, this is dangerous to the testicle in that the inflammation about the blood vessels may seriously interfere with the organ or may even infect it and produce atrophy.

In my nineteen cases operated upon by the open method primary union was obtained in all but one case. This case was operated upon by the scrotal route. It occurred at this hospital, and was the first surgical case I operated on here. At that time the conditions were not favorable to absolute aseptic work, and this, in connection with the incision through the scrotum, accounted for the infection. Fortunately the infection was not severe, and I am inclined to believe that, other conditions being equal, had the operation been done by the suprapubic route no infection would have occurred. With asepsis thoroughly under control the scrotal route may be chosen in certain selected cases, especially in those in which the scrotum is elongated, for by sewing the incision transversely the scrotum may be shortened. But as the main danger in the operation for varicocele arises from infection of the wound, the suprapubic method is to be preferred when most rigid asepsis is required.

Aseptic technic.—The patient is prepared by shaving the pubes, scrotum, and adjacent parts and applying a dressing of green soap the night before the operation. Green soap is preferred to a bichloride dressing in that it loosens the epidermis and allows a thorough cleansing. The patient having been placed under an anæsthetic, the parts are thoroughly scrubbed with green soap. They are then rinsed with sterile water, scrubbed with alcohol, then with bichloride solution 1:1000 and rinsed with sterile water. The penis is carefully enveloped in a sterile cloth, and the operator and his assistants all wear rubber gloves. I now use rubber gloves in all my operations, and consider them of the greatest value in furthering asepsis.

The operation by the suprapubic route.—The incision is made above the pubes and over the external inguinal ring, nearly parallel to Poupart's ligament, and about an inch and one-half in length. It is carried down until the external ring is exposed and the cord brought into view. The sheath of the cord is now opened and the veins which lie at the anterior portion of the cord are seen. In varicocele the enlarged veins lie at the anterior part of the cord and in front of the vas deferens and spermatic artery. If care be taken these veins can be lifted up and away from the vas deferens and artery and isolated from the latter by passing a blunt hook beneath them. Having done this, the veins can be separated by blunt dissection from the underlying structure of the cord well down toward the testicle by pulling them up as the dissection proceeds. Having done this, the operator should determine the position of the vas deferens and artery to be sure that he does not include them in his ligature. The veins being brought well out through the incision, a ligature is passed about them above and another ligature is tied about them below well down toward the testicle. The intervening portion is excised and the cut ends approximated and tied together by the ligatures. The wound is now closed by a subcuticular suture of catgut, covered with sterile gauze, cotton, and a spica bandage.

Dangers of the operation.—The danger of infection has already been discussed. The remaining danger is atrophy of the testicle from inclusion of the vas deferens or spermatic artery in the ligatures. This the operator must be careful to avoid, and is easily done by careful attention to the structures involved before the ligature is passed.

Operation by the scrotal route.—As before stated, this operation is not advised except in special cases and when the operator is absolutely sure of his aseptic technic. The operator, standing on the left of the patient, grasps the cord between the thumb and forefinger of his left hand, pressing the cord up to the anterior surface of the scrotum and holding the testicle retracted in the palm of his hand. Holding the knife in his right hand, he makes an incision about an inch long through the skin and cuts carefully down to the cord which he is pressing upward with the left thumb and forefinger. By holding the cord firmly to the front of the scrotum in the manner indicated and cutting carefully, the distended veins are soon brought into view, and this with much less dissection and consequent disturbance of the tissues than occurs

when the incision is made into the body of the scrotum and the cord searched for. The veins having been brought into view the operator, still holding the cord to the front with his thumb and forefinger, frees them to a sufficient extent to pull the cord out of the incision. Having done this, he holds aside the vas deferens and separates it from the enlarged veins. The most difficult part of the operation now begins. The operator, grasping the cord, feels for the pulsation of the artery, and having found it dissects the artery free from the veins. This is sometimes quite difficult and troublesome to do, but the artery should by no means be included in the ligature with the veins, as atrophy of the testicle will very probably result. Having separated the vas deferens and artery from the veins, the latter are freed well down to the testicle and well up to the external inguinal ring. A catgut ligature is then passed around the veins above and tied, the ends of the ligature not being cut off. The veins are ligated below in a similar manner and the part between the stumps excised. The stumps are approximated and tied together, using the ends of the ligature for this purpose. This raises the testicle higher in the scrotum than it was before the operation and does away with the sagging of the organ. The skin wound is closed by subcuticular catgut suture or with interrupted suture of horsehair. A dressing of sterile gauze covered with absorbent cotton is placed over the closed wound and a suitable bandage is applied.

Results of operations.—The results of the operation are always good, provided it is done aseptically and the operator does not include the vas deferens or spermatic artery in his ligature. In my 19 cases I had one infection which, as stated before, was slight and did not lead to any serious trouble. So far as I know there was no atrophy of the testicle in any case and the cure was radical in all.

General conclusions.—As a result of my experience I am of the opinion that a varicocele which produces disability and which has originated in the service should not be considered a cause for a discharge, but should always be operated upon provided the operator is so situated that he can be reasonably sure of asepsis.

Report of Capt. A. E. Bradley, assistant surgeon, United States Army, Fort Snelling, Minn., December 22, 1900.

A description of the method of operation in these cases can not be found in any text-book available, but I am not prepared to claim that it is new. I was prompted to employ it in the first instance in the case of a soldier concerning whom the surgeon of his post persistently claimed the existence of hernia. Reports of this case, Private C. R. L., Troop H, First Cavalry, were forwarded August 15 and October 26, 1900.

In view of the opinion of the surgeon at Fort Meade, S. Dak., it was deemed advisable to expose the inguinal canal and the abdominal rings and at the same time operate for the varicocele, the existence of which was evident. An incision about 2 inches long was made in the line of the inguinal canal well down toward the base of the penis. The cord was exposed external to the external ring and easily drawn forth with the mass of varicose veins. The testicle itself was drawn out and fully exposed with great ease. The veins were excised, the stumps drawn together shortening the cord, and the testicle replaced. The abdominal rings and the canal were found normal. A few catgut sutures closed the deeper structures and subcuticular silkworm-gut suture the skin incision. A collodion dressing was applied, and convalescence was normal.

Case 2.—Trumpeter L. E. S., Troop G, First Cavalry, was admitted from Fort Yellowstone, Wyo., October 20, 1900, for operation for varicocele. In view of the ease of operation, as I found it in L.'s case, I determined to use the same method. The usual preparations were made, and I operated October 21, 1900. A small incision was made as before, the cord exposed and dragged up and out, the veins ligated and excised, without, however, delivering the testicle out of the incision. The wound was closed as in the first case, and the result was perfectly satisfactory.

Case 3.—Sergeant J. W. M., Company A, Eighth Infantry, was admitted to hospital October 8, 1900, for chronic sciatica, and while in hospital expressed a desire to be operated upon for varicocele. Operation was performed as in case 2 with a perfect result.

I believe this method to have advantages over the scrotal method. There is greater probability of perfect preparation and less danger of wound infection. The wound is well up on the pubes and away from sources of infection.

The difficulty of avoiding wound infection in scrotal work is well known. Owing to the thin and relaxed walls of the scrotum and the cremaster action, it is difficult to keep perfect apposition of the parts divided in the scrotal operation. In the high operation this is avoided.

EXTRACTS FROM A PAPER BY LIEUT. COL. NICHOLAS SENN, CHIEF SURGEON, UNITED STATES VOLUNTEERS, CHIEF OF OPERATING STAFF WITH THE ARMY IN THE FIELD, FROM HIS WORK ON THE MEDICO-SURGICAL ASPECTS OF THE SPANISH-AMERICAN WAR.

For years I have been convinced that too many operations are being performed for varicocele, and I have always advised my students to limit operative intervention to the exceptional cases in which well-marked symptoms warranted such a course. Most of the persons suffering from this affection that apply to the surgeon for treatment are sexual neurasthenics, young men who have made a deep study of this subject with the aid of quack literature. In the great majority of cases the symptoms presented are due to a morbid mental condition rather than the varicosity of the spermatic veins. I have frequently observed that the size of the varicocele bears no relation to the degree of suffering and distress complained of by the patients. Recent experience has only confirmed my views concerning the relationship of varicocele to the subjective symptoms associated with this condition. During the month of May I had, as a member of the examining board, an opportunity to examine, at Camp Tanner, Springfield, Ill., 9,815 recruits for the volunteer service. I took special pains to investigate varicocele as a cause of disability. From the very beginning I was surprised at the prevalence of this affection. I classified the cases according to the number and size of the varicose spermatic veins into (1) small varicocele, (2) medium-sized varicocele, (3) large varicocele. The disease was found more frequent in the robust strong than in men of slight build. In most instances the men were otherwise in excellent condition. Atrophy of the testicle was seldom noted. The subjects of large varicocele were invariably questioned as to whether or not this pathologic condition gave rise to discomfort or pain, and, with the exception of three or four cases, the replies were always negative. In more than half the cases that presented themselves the men were ignorant of the existence of the affection. * * * The result of these observations led me to the conclusion that varicocele is very seldom a cause of disability for military service, and that operative treatment is rarely indicated. This short communication is made for the distinct purpose of calling attention to the frequency with which varicocele is met with in otherwise healthy and robust subjects, and in formulating a serious and positive protest against the too frequent recourse to operative interference so common with surgeons of all grades and in all civilized countries.

The following table shows that of 9,815 recruits examined 2,078 were affected with varicocele—that is, 21.17 per cent. * * * These statistics are absolutely reliable and fortify my position taken in this paper that varicocele in varying degrees is met with in nearly one out of four men between the ages of 18 and 30 years, and that of itself it seldom gives rise to any noticeable disturabnce, and that the patients who apply for treatment do so in consequence of nervous disturbances entirely separate and independent of the enlarged spermatic veins. I am satisfied that in many of these cases an operation is superfluous, provided the surgeon can secure the full confidence of the patient, which is an essential prerequisite to successful treatment short of an operation. For my own part I shall not perform as many operations for varicocele since I have had an opportunity of studying the pathologic and clinical features of this affection on such a large scale.

GEO. M. STERNBERG,
Surgeon-General, United States Army.

IDENTIFICATION OF DESERTERS AND OTHER UNDESIRABLE MEN.

From July, 1890, the time of the first identification, to June 30, 1901, 2,298 identifications have been made; 18 in 1890, 111 in 1891, 215 in 1892, 104 in 1893, 110 in 1894, 121 in 1895, 108 in 1896, 68 in 1897, 347 in 1898, 480 in 1899, 351 in 1900, and 265 during the first half of 1901.

Of the 1,682 men identified up to the end of 1899, 401 were retained in service, 844 were discharged from the Army, and 437 deserted. The disposition of the men identified during 1900 can not be given, owing to a number of cases being still under investigation.

HOSPITALS.

During the year the general hospitals in Manila, P. I., which were fully described in my last annual report, pages 108–116, have been in excellent condition and the departmental hospitals compare favorably

with them. Both were outfitted with all modern equipments. Regimental hospitals of varying capacity have fulfilled their purpose as emergency hospitals, but in progress of time as the troops become established in permanent posts these regimental hospitals will have to give place to carefully organized post hospitals.

The Second Reserve hospital, which was established in a brick building formerly used as a boarding school for girls, was closed July 1, 1901, and its patients, hospital-corps men, and nurses transferred to the Santa Mesa hospital. Its equipment was in part distributed to other hospitals and in part placed in store in the medical-supply depot.

The full equipment of a 100-bed hospital was established at Nagasaki, Japan, in January, 1901, with a sufficient personnel, Capt. I. W. Rand, assistant surgeon, United States Army, in command. This was intended for the purpose of taking from passing transports sick and wounded men who were not in condition to continue the voyage to or from the United States.

The post hospitals built at the new posts in Cuba are such as to give the sick soldier all the advantages of modern treatment with the best hygienic surroundings. They consist of frame pavilion buildings with free ventilation, double roofs and wide porches, the wards large, to give unrestricted air movement. None of the old Spanish stone hospitals are now in use except at the post of Holguin.

Excluding from consideration the Army and Navy General Hospital, Hot Springs, Ark., and the general hospital, Fort Bayard, N. Mex., supra page 13, both of which are devoted to special lines of medical work, there have been during the past year only two general hospitals in service in the United States: The general hospital at Washington Barracks, D. C., having a capacity of 50 beds, and the general hospital at the Presidio of San Francisco, Cal., with a capacity at the present time of 650 beds, but susceptible of a prompt extension to meet emergencies. The latter hospital is the home depot for the reception of invalids from the Division of the Philippines. The report from this hospital is given below:

REPORT OF THE UNITED STATES GENERAL HOSPITAL, PRESIDIO OF SAN FRANCISCO, CAL., FOR THE FISCAL YEAR ENDING JUNE 30, 1901, LIEUT. COL. A. C. GIRARD, DEPUTY SURGEON-GENERAL, UNITED STATES ARMY, COMMANDING.

In the annual report of this hospital for the year ending June 30, 1900, a brief history of its establishment was given, together with a detailed description of the buildings. During the past year the power house, including the ice and refrigerating plant, heating and electric system, and laundry, have been completed and put in operation. There has also been completed a building at the southern end of the patients' mess hall which will be used as a chapel and library for the hospital. The large number of patients received during the year has necessitated the use of six wooden barracks belonging to the post, which have been pretty constantly occupied.

On June 10, 1901, the northeast portion of the hospital was destroyed by fire. This portion included the following buildings: Patients' dining room, patients' kitchen, bakery, cold-storage room, medical storeroom, ordnance storeroom, quartermaster storeroom, carpenter shop, paint shop, hospital corps dining room and kitchen, ward F, tent hospital for 45 tents, lavatories and tent hospital, and a portion of ward G. The losses occasioned by this fire will be more fully referred to in another portion of this report.

In preparing the report of the hospital it has been thought best to divide it into the following sections: The general administration, medical work of the hospital, surgical work of the hospital, certificates of disability, eye, ear, nose, and throat clinic, bacteriological laboratory, X-ray laboratory, and report upon insanity. In this way a more thorough knowledge of the immense amount of work which has been accomplished during the year can be gained, and the facts pertaining to each department grouped in their proper places.

General administration.—There have been but few changes in the administration of the hospital during the year. The detailing of a permanent staff of medical officers has greatly facilitated and increased the accuracy and value of the work. In a hospital such as this, where the patients arrive at irregular intervals and in large numbers, it is impossible to satisfactorily conduct the service without a certain number of permanent medical officers. At times the influx of large numbers of patients within short intervals has severely taxed the administrative work of the hospital. This has been especially true during the last three months of the fiscal year, during which time the United States Volunteers were being mustered out of the service.

I. *Report of the quartermaster.*—The following statement shows the purpose, amount authorized, and amount expended in repairs, alterations, and improvements made or in progress at the hospital during the fiscal year:

Date authorized.	Amount authorized.	Amount expended.	Purpose.
QUARTERMASTER-GENERAL'S OFFICE.			
Apr. 17, 1900	$1,891.26	$1,891.26	From funds fiscal year 1900 for tin roofing verandas.
May 3, 1901	500.00	450.00	For painting verandas and railings and calcimining hospital corps and nurses' quarters.
July 27, 1900	1,720.00	1,747.25	For general repairs, materials, and labor.
Nov. 6, 1900	200.00	200.00	For materials and labor for installing tub, closet, and washstand in administration building.
Nov. 15, 1900	135.50	97.20	Laying floor under diet kitchen.
June 14, 1901	75.00	75.02	For repairing roof, Ward G.
Mar. 21, 1900	384.00	405.60	From funds fiscal year 1900 for laying tile and lowering floor in operating room.
Oct. 5, 1900	21.60		
Oct. 4, 1900	47.50	47.50	For adjusting blow-off to boilers.
Oct. 8, 1900	325.00	325.00	Installing additional laundry machinery.
Feb. 16, 1900	214.60	214.60	For laying surface guttering.
May 9, 1901	434.38	381.89	For making changes to water system.

Total expended from funds fiscal year 1900	$2,296.86
Total expended from funds fiscal year 1901	3,538.46

A new chapel has been constructed by the chief quartermaster, Department of California, at a cost of $2,700.

In addition to the work done for which allotments were made the roadways about the hospital have been graded with cinders and rolled, the inclosures in the rear of the hospital fenced (this work being done by enlisted men), and the grounds about the hospital surfaced, properly graded, and sown with blue-grass seed. A tent hospital of fifty beds was established, the floors and walls being of wood. Electric lights were placed in each tent, two lavatories built for use of same, the plumbing system connected, and sidewalks laid in front and rear of the wards.

The floor of the operating room was lowered and a tile floor put in. The floors of the diet kitchen were reenforced to keep them from settling, on account of the heavy concrete floor, while those of the wards and administration building and patients' mess hall were polished with hard oil finish. An additional bath tub, water-closet, and washstand were installed on the second floor of the administration building. The sewer pipe in the rear of the administration building was found to be too small, easily becoming clogged, and was replaced by a larger one. About 715 feet of brick guttering has been laid during the year, greatly improving the sanitary condition of the hospital.

The installation of the steam, electric light, laundry, and refrigerating plant has been one of the most valuable additions to the hospital. Not only has this plant proven of great value because of the promptness and ease with which the work has been executed, but also because it has resulted in a great financial saving to the hospital. The following table will show the monthly cost of operation of the plant, together with the former cost of the work which it performs and the resulting monthly saving. Plant began operation August 28, 1900.

Monthly cost of operation:	
Engineers	$180
Firemen	100
Laundrymen	55
Laundrywomen	50
Oil, repairs, ammonia	75
Coal	700
Total	1,160

Cost per month before installation of steam, electric-light, laundry, and refrigerating plants:

Average cost of lighting per month (figures furnished by quartermaster's department)	$940.62
Average cost of laundry	918.42
Average cost of ice (figures furnished by subsistence department)	74.28
Total	1,933.32
Former cost	1,933.32
Present cost	1,160.00
Monthly saving	773.32
Saving in laundry for post, transports in harbor, etc	500.00
Total monthly saving	1,273.32

The laundry, which was opened August 23, 1900, and in which the laundry work of the general hospital, the hospitals of all the posts in the vicinity of San Francisco, and of all transports plying between San Francisco and Manila, is in the charge of a hospital steward, and employs one chief laundryman, two women, and four hospital corps men eight hours daily.

Its machinery consists of three 150-sheet washers, one 24-inch and one 20-inch centrifugal extractor, two mangles, each with one 64-inch cylinder and two 11-pound electric irons, all of which are operated by a 15-horsepower electric motor.

The steam drying room has nine compartments and occupies a floor space of 7 by 8 feet, and is capable of drying 1,000 sheets per day. Each morning the soiled linen is collected from the wards and exchanged from the linen room at the laundry for clean. Each afternoon, after these soiled articles are washed, they are counted and stored in the linen room to be issued again the next day. In this way each article of linen is daily accounted for. The average daily output is 2,500 pieces to laundry, which requires 50 pounds of soap, 10 pounds of caustic soda, 10 pounds of chlorid of lime, and 1 pint of blueing.

The following transportation has been furnished by the quartermaster during the year:

Patients to Fort Bayard, N. Mex	124
Patients to Hot Springs, Ark	216
Patients to various stations	70
Total patients	410
All other transportation	225
Transportation for messengers	805
Packages transferred	1,326

During the year the quartermaster has issued clothing to patients and detachment of hospital corps to the value of $12,967.28.

The following is a statement of the funds pertaining to the quartermaster department expended during the fiscal year:

Regular supplies	$5,016.87
Incidental expenses	384.40
Army transportation	1,257.05
Barracks and quarters	2,600.67
Clothing and equipage	10.00
Total	9,268.99

II. *Report of the commissary officer.*—The number of rations issued during the year has been 87,752. The average number of men and women to whom rations were issued has been 238.

The following disbursements were made during the year:

Paid for food supplies	$56,623.40
Commutation of rations	5,081.00
Paid for fresh beef (under contract), savings, labor, etc	6,910.64
Total expended during year	68,615.04

The average number of patients supplied has been 447, and commutation of rations has been paid to 825 men.

III. *Property office.*—The work in the property office has been under the charge of a contract surgeon, United States Army, who has been assisted by one acting hospital steward and two privates of the hospital corps, one acting as property clerk and the other as storekeeper. The handling of the medical property has been conducted in the following manner:

Requests for supplies have been put in every two weeks. On receipt of supplies from the supply depot they have been carefully checked over with the packer's list by either the steward or storekeeper, and the supplies then placed in the storeroom, from whence they are only issued by orders signed by the ward surgeons and O. K.'d in the property office. Upon arrival the drugs were turned over to the dispensary storekeeper. The property storekeeper sends to the office his report of daily issues, when the invoices are then made out by the clerk and signed by the property officer. The ward officers and those in charge of the various departments render a monthly statement of property received, disposed of, and lost, and these reports are then checked over with the invoices and receipts, and the losses covered by affidavit. The invoices from the medical supply depot are carefully compared with the packer's list, and receipts, after being also compared, are signed by the commanding officer.

The fire June 10, 1901, originated in such close proximity to the storerooms that practically the whole stock on hand was destroyed. Since the fire the storeroom has been located in one of the wards, where one or more of the men connected with the property office always remain.

IV. *Dispensary.*—The dispensary is in charge of one acting hospital steward and two privates of the hospital corps. It is open from 6 a. m. to 9 p. m., and during the night one man remains subject to calls from the bell attached to the outer door. The dispensary is thus accessible for emergencies at all hours.

In addition to drugs upon the supply table there are carried in stock about 150 medicines. The medicines and liquors, with the exception of small quantities used from day to day, are arranged according to the supply table in the storeroom designated for that purpose.

A stock book has been kept showing amount on hand the first of each month, the amount received, and the amount expended, thus enabling the steward in charge of the dispensary to render requisitions for medicines needed without carrying any excess of stock on hand. A liquor book is kept which contains an accurate report of alcoholics used in each ward during the month and the date of each issue. A monthly report is rendered to the executive officer, while the original prescriptions for liquors are retained on file in the book kept for that purpose.

All prescriptions are written in the metric system, and except in cases of emergency presented at the dispensary before 10.30 a. m. Each ward is furnished with a suitable receptacle for carrying medicines from the dispensary and each prescription bears the name of the ward for which it is intended. During the fiscal year the average daily number of prescriptions dispensed has been 200.

V. *Record Office.*—The personnel of the record office is as follows: One hospital steward, in charge; 1 acting hospital steward, 10 clerks, and 1 orderly.

The following records and books are kept: Register of patients, regulars; register of patients, volunteers; index to register of patients; "letters received" book, with index; "letters sent" book, with index; consolidated morning report book; record of deaths and interments; record of summary court; monthly report of sick and wounded; monthly post return; file of retained copies of S. C. of D.; descriptive and clothing book, with index; muster and pay rolls; file of clinical histories of patients, together with copies pathologist's report of sputa, blood, faeces, and urine examinations; records of cases tabulated under headings in accordance with classified lists of causes of admissions to sick report as laid down in the Manual for the Medical Department.

One hospital steward acts as chief clerk and is responsible for the proper conduct of the clerks in the office and for the proper preparation and filing of records.

One acting hospital steward (1) has charge of surgeon's certificates of disability. (2) Prepares file cards showing under headings in accordance with classified lists cause of admission to sick report as laid down in the Manual for the Medical Department, with the hospital number of each case. These hospital numbers are entered on the cards in black ink in the cases of regulars, and red ink in the cases of volunteers. Thus upon reference to the file cabinet the card headed with any one disease or injury shows at a glance, not only how many cases under that heading have been treated at the hospital, but also the hospital number of each case for immediate reference to register of patients. (3) Arranges and keeps file of clinical his-

tories of patients and prepares for file therewith copies of the pathologist's reports of sputa, blood, fæces, and urine examinations.

One clerk is detailed in charge of the "letters received" book and furloughs.

One clerk in charge of "letters sent" book, summary court record and ledger, showing valuables deposited by patients.

One clerk (1) has charge of consolidated morning report book and daily numerical report book by organizations. He also prepares a daily list from his books of the number of patients in hospital who live on 40 cents per day; the number of discharged soldiers for whom rations are drawn; the number of quartermaster employees and retired soldiers to be charged 40 cents per day, and the number of officers who are to pay $1 per day for subsistence. (2) Prepares monthly post return.

One clerk has charge of descriptive lists of patients and superintends the preparation of final statements, discharges, and new descriptive lists.

Two clerks prepare under the direction of the clerk in charge, who must be a good accountant, discharges, final statements, and descriptive lists; keep the clothing book of patients, and prepare clothing schedule of patients.

One clerk has charge of the register of patients, prepares monthly report of sick and wounded, keeps record book of deaths and interments, and prepares transfer slips for patients transferred.

Two clerks (1) keep record of pay, clothing, etc., of patients and note all changes as they occur on card-index register, from which, when a patient is ordered discharged or otherwise disposed of, all necessary data for the preparation of final statements, etc., are furnished. (2) Prepare pay and muster rolls of patients from the card-index register.

One orderly, used as a messenger, keeps files of the orders and circulars, cares for the circulating library, and polices the offices. This force under ordinary circumstances will be able to perform the work of a 400 to 600 bed hospital, but occasionally there is a demand for a large amount of work, such as discharging volunteers "services no longer required" or on surgeon's certificate of disability, which calls for a temporary increase.

VI. *Patients and hospital corps mess.*—The personnel of the mess department of the United States Army general hospital, Presidio of San Francisco, Cal., consists of a mess officer, who has under his charge 1 hospital steward, 1 acting hospital steward, 2 civilian employees, and 20 privates of the hospital corps. It includes 2 kitchens and 2 dining rooms for the patients, a kitchen and dining room for the hospital corps, and a mess storeroom, from which supplies are issued to the kitchens and wards. It also includes a bakery, which employs 1 civilian baker and 1 to 2 hospital corps men when in operation.

The duties of the hospital steward of the mess consist in supervising the details of preparation of diets for the sick, the cooking for the hospital corps, and the management of the bakery. He receives and checks all food supplies for the hospital in the mess storeroom and accounts for them in a proper form of receipt. Upon the requisition of the ward surgeon and cooks, he issues these supplies daily at a stated time; the requisitions are his vouchers for dropping the supplies on proper forms of supplies issued. He prepares daily a morning report, showing the number of patients in hospital and the allowance to be expended per day. This report also shows the daily total amount expended and the balance or deficit for the day. A supplementary report, showing the daily expenditures in detail, accompanies this form. Daily trips are made with a market wagon to the city to purchase fresh fruits, vegetables, butter, and eggs. Extra supplies, not kept in the commissary, are purchased from various firms in the city by bid forms under the direct supervision of the commanding officer.

During the year ending June 30, 1901, an average of 466 patients were fed daily from the diet kitchen of the general hospital, and in addition 1,935 casuals were fed who passed through the hospital for examination (after arrival in transports from the Philippines).

Recently difficulty has been experienced in maintaining the high standard of diet adopted at this hospital from the allowance of 40 cents per day for each enlisted patient. This is due to the large decrease of enlisted patients with the allowance of 40 cents per day and the increase of patients as discharged soldiers too sick to travel, who were allowed but a ration in kind yet actually required the same special diet furnished other patients. The number of these patients increased upon the muster out of each regiment until the actual allowance per patient per day was but 31½ cents, computing value of the ration in kind furnished to muster-out patients at 15 cents per ration. In addition extra quantities of food were frequently required by wards in excess of the number of patients reported. This was corrected by a circular order published July 26, 1900, as follows:

"PAR. 1. Attention of the ward officer is invited to the numerous discrepancies occurring on their 'special diet list and diet orders,' the number of special diets reported on the diet order not corresponding with the number of special diets asked for on diet list.

"Hereafter the number of special diets asked for must not exceed the number of patients who are actually on such diet in the wards.

"Patients on liquid diet requiring articles of special diet will be classed as special, instead of liquid. It is thought the amount of food furnished for each diet is ample and sufficient, and the practice of asking for an excess above the number of diets required is not necessary."

As per diem allowance per patient was continually decreased under the influence of a continuous increase of discharged soldiers and a decrease in the 40 cents per diem patient, it becomes necessary to modify the diet table, and the following orders were issued on May 17, 1901, and a substitute special-diet table published:

"PAR. 3. The daily order list of special diet, form No. 20, is suspended until further orders.

"Ward surgeons will hereafter use the diet order only, showing the number of liquid, special, light, and full diets required for the current day. All patients will be sent to the mess hall for meals as soon as able to eat the prescribed full diet."

At the same time the light and full diet orders were modified to meet the existing conditions.

Two kitchens and dining rooms have been kept in operation for the use of the patients. A third kitchen is operated for preparing food for contagious cases whenever required. The kitchens and dining rooms are under the immediate direction of an acting hospital steward. One chief cook, at $60 per month, and one assistant cook, at $40 per month, are employed in this kitchen. Five privates of the hospital corps are on duty in the kitchen and three privates of the hospital corps in the dining room at the general hospital proper. Two privates of the hospital corps are on duty in the auxiliary kitchen at the wooden barracks. The number of men employed in these kitchens and dining rooms are increased and reduced according to requirements of the service. In addition, two privates of the hospital corps are on duty in the mess storeroom. Three men on duty in the dining room have the police and care of all things pertaining to that room.

During the year four steam-jacketed boilers for cooking soups, meats, etc., two steam kettles for cooking vegetables, one egg boiler, and two 60-gallon urns for tea and coffee, with 80-gallon urn for hot water, were placed in the kitchen, making it one of the best-equipped hospital kitchens on the coast.

The food carriers for the wards and dining rooms, which were designed by Lieut. Col. A. C. Girard, deputy surgeon-general, United States Army, rendered efficient and valuable service as conveyances, and have proved so valuable that no change from the original model, except as to size and pattern of wheels, could be suggested. These have been modified in the new cart now in use.

The efficiency of the personnel of the hospital corps and civilians on duty in the kitchen and dining rooms is excellent, each individual being especially adapted to the duties he performs. The work in the kitchen, preparing the various diets and serving the same, is well and expeditiously performed.

During the year, load after load of transport sick have passed through this hospital, hundreds simply passing through for examination. All, however, were fed as soon as they arrived at the hospital. The men have frequently prepared a dinner or supper on less than an hour's notice to 450 new arrivals, and this without deviation from the regular bill of fare.

When the kitchens and dining rooms were destroyed by fire at 4 p. m., June 10, 1901, and all food on hand was burned, a new kitchen was opened, new supplies purchased and cooked, and supper served at 7 p. m., only one and one-half hours later than the schedule time.

During the twelve months from July 1, 1900, to June 30, 1901, these men prepared and served 510,839 meals.

Meal tickets are used for patients messing in the dining room. A check is kept on these by entering the number received at each meal from the respective wards and comparing this number with the ward diet orders.

The bakery connected with the kitchens did good work during the year, the bread baked being of superior quality. Two grades of flour are used in baking—the issue flour and family flour. In addition, 3 gallons of skimmed milk are used for each 150 loaves of bread. The bread made is of an even, fine texture, white, and does not dry out as readily as the ordinary post bread.

An ice plant at the hospital furnished sufficient ice for the needs of the hospital. In addition thereto a cold-storage room is located in the basement of the kitchen for the preservation of meat and other perishable articles.

Milk is delivered at the hospital daily at 6 a. m. and 11.30 a. m. It is tested for purity and cream once a week in the laboratory, and has always been found to be of a high standard. A large amount of milk is employed in the preparation of koumiss, in which form it is given to many patients.

When yeast for koumiss is desired by ward surgeons it is ordered from the mess steward twenty-four hours in advance of the time when it is desired for use. Orders state the number of bottles of koumiss to be made. The required amount of yeast will then be furnished.

On June 10, 1901, the entire culinary department of the hospital was destroyed by fire. The destruction included the patients' kitchen and dining room, hospital kitchen and dining room, the mess storeroom, the bakery, cold-storage room, and vegetable storeroom. Everything was destroyed by this fire. So rapid was its spread that nothing could be saved. Immediately after the fire, ward H was temporarily fitted up as a kitchen and dining room and is now in use as such until the completion of the kitchen and dining room, which are being rebuilt.

Bread has been purchased from a city bakery at a cost of 3 cents per loaf, since the date of the fire. It is expected that the bakery will reopen within a few weeks.

The hospital corps kitchen and dining room have been moved to barracks No. 5 of the auxiliary hospital buildings in the post proper. The food of the hospital corps is varied as much as possible by addition of fresh vegetables and fruits and change of meats. It is well cooked, of an excellent quality and sufficient variety.

The female nurses have a separate kitchen and dining room from the hospital corps, under charge of a nurse. A woman cook and two Japanese waiters are employed. The savings of rations of female nurses and a small percentage of money received from sick officers for board is allowed their mess and credited on the hospital fund statement. The amounts so credited are expended for their benefit under the supervision of the nurse in charge of the mess. Any excess of expenditures which may be incurred is met by a voluntary individual assessment levied upon themselves.

VII. *Telephone and telegraph department.*—Connected with the hospital is a regular Western Union telegraph office, as well as a city official telephone and a pay telephone. Besides these, there are three local systems.

System No. 1: System No. 1 connects the general hospital with the auxiliary hospital, the lower corrals for the use of ordering ambulances, conveyances, etc., and to the hospital electric and heating plant, and the office of the steward in charge of the mess. The lines and instruments used in this system belong to the signal department of the United States Army.

System No. 2: A local system connecting all the offices of the hospital, commanding officer, executive officer, chief nurse, record office, quartermaster's office, officer of the day, hospital corps detachment, hospital kitchens, and ten wards. This system is entirely confined to the general hospital, and the lines and instruments used are the property of the Signal Department of the Army.

System No. 3: This system, known as the Presidio local exchange, connects the general hospital with the post hospital, Presidio, Presidio post headquarters, and the quarters of the commanding officer of the hospital. This system is connected with the Presidio post exchange, whereby the general hospital can be connected with all the offices and departments of the Presidio post and with the forts in the harbor of San Francisco, i. e., Fort Mason, Fort Baker, Alcatraz Island, Angel Island, and Fort Scott. The lines and instruments used in this system belong to the Signal Department of the United States Army.

Long-distance connections are transacted over the official telephone, the general hospital being a regular long-distance station.

The personnel of the telegraph and telephone department consists of two privates of the hospital corps; each of whom works seven and one-half hours per day, relieving each other respectively. At 10 o'clock at night the telegraph department is closed and the guard in charge of the administration building answers the telephone and transacts the business necessary from that time until opening of the office at 7 o'clock in the morning.

The approximate number of Western Union messages sent since the opening of the office November 9, 1900, has been 1,800.

The approximate number of Western Union messages received since the opening of the office November 9, 1900, has been 1,700.

Copies are kept on file of all messages received and sent since the opening of the office. The office has handled the personal business of the inmates and employees of the hospital in addition.

The city official telephone is for the transaction of official business pertaining to the hospital. Daily reports are kept of the switches made and the business transacted, and these reports are inspected daily by the commanding and executive officers.

The approximate number of messages sent over the official telephone for the year ending June 30, 1900, has been 12,000.

VIII. *Printing office.*—In the printing office is done all the printing of forms needed in the administrative work of the hospital. The printing outfit consists of the following: A Gordon press, capable of printing a sheet 12 by 15 inches; a Challenge paper cutter, with a 14-inch blade; a letterpress; and 25 fonts of type, ranging in size from 6 point to 30 point. The press is run by foot power and can not stand high speed. It gives a clear, reliable print, but has to be constantly watched because of worn parts.

During the year five cases of new type have been added, and with the useful cases already on hand the office can properly handle all the regular work of the hospital.

The personnel of the printing office consists of two privates of the hospital corps. A large part of the work consists in printing the forms for the reports and records. Of these there are 98 numbered forms, and a great many which it has been found impracticable to number. The unnumbered forms are such as index cards, bed cards, baggage checks, meal tickets, etc.

The miscellaneous work of the printing office consists of printing labels for books and bottles, general orders, special orders, circulars, programmes, letter heads, addresses on envelopes, signs, notices, and note heads.

During the past month, in which the office did the average amount of work, 43 regular numbered forms were printed, making in round numbers 36,000 blanks. Most of the tabulated blanks required from two to three forms and impressions. In this list is not included the miscellaneous work done in the office during that time.

A very limited amount of printing has been done for places other than the general hospital. In June this office printed two tabulated forms and two straight forms for the school of instruction on Angel Island, two straight forms for the post quartermaster, and two for the muster-out camp.

Work which is completed in the printing office for use in one department of the hospital only is delivered to that department. If it is for general use it is kept in the printing office and issued as needed.

IX. *Hospital corps.*—The hospital corps of the hospital is divided into a permanent and casual detachment. The average number per day of men on duty in both detachments during the fiscal year is given below:

	Daily average strength.	Sick.
Permanent detachment:		
Hospital stewards for duty	3.92	0.12
Acting hospital stewards for duty	5.26	.20
Privates for duty	130.47	5.05
Casual detachment:		
Hospital stewards	1.01	1.31
Acting hospital stewards for duty	1.25	.09
Privates for duty	11.27	18.74

Confinement.

Permanent detachment:	
Hospital stewards	0
Acting hospital stewards	0
Privates	1.50
Casual detachment:	
Hospital stewards	0
Acting hospital stewards	0
Privates	.48

The following rules and regulations concerning the nospital corps have been issued during the year:

"Men desiring to leave the hospital on pass will apply to the steward in charge of the detachment before 9 a. m., and no passes will be approved after that hour unless in case of extreme urgency.

"Men applying for passes are expected to avail themselves of the same, and no one will be permitted to remain around the hospital during the hours named on pass unless it has previously been turned in.

"Upon leaving the hospital each man will possess himself of his pass and upon returning will turn in the same to the door guard, who will note the hour of return on the pass. No one will be permitted to leave the hospital corps quarters by the window in the front of the building, but must pass through the administration building.

"Check passes will be granted as often as the exigencies of the service permit at the discretion of the commanding officer. Passes to extend to or beyond reveille will be granted once a week.

"Men desiring to go on pass during the hours of duty will have the same indorsed by the officer or steward in charge of their work and will be presented for signature of the detachment commander with other passes at the designated hour.

"Men will be permitted to leave the hospital when off duty till 11 p. m. without pass. Members of this detachment will not be permitted to leave the hospital either with or without pass unless they are neatly and cleanly dressed. When in soldiers' clothing, the blue undress uniform will invariably be worn. Shoes must be polished, and the white collar must be worn. Civilian clothing may be worn while on pass, but no mixed uniform will be allowed.

"After 6 p. m. men going on pass will make down their beds before leaving the hospital, and upon returning after 9 p. m. will remove their shoes as soon as they enter the hallway. No loud or boisterous conversation will be allowed in the lavatories or hallways after that hour, and no unnecessary noise will be permitted in or around the squad rooms.

"Anyone failing to comply with these rules will be denied pass privileges for such length of time as the gravity of the case warrants. Repeated failures will entail severer punishment."

X. *Female nurses.*—The work of nursing the sick at this hospital has been entirely performed by female nurses under the charge of a chief nurse. During the year 142 female nurses have reported at this hospital, of whom 90 were transferred to the Philippine Islands, 9 to Fort Bayard, N. Mex., 1 to Fort Sam Houston, Tex., and 42 were discharged from the service.

The number of nurses on duty June 30, 1900, was 40, which number has been retained throughout the year.

MEDICAL WORK OF THE HOSPITAL.

The medical work was attended to practically by contract surgeons, of whom a certain number had been detailed permanently to this hospital. As a rule, 1 medical officer has had charge of two wards of 40 patients each.

Connected with the medical work of the wards there has been in operation an X-ray and bacteriological laboratory and an eye, ear, nose, and throat clinic. The details of the work done in each of these will be found in other portions of this report. The entire medical work of the hospital has been under the charge of a medical superintendent.

A very large percentage of the cases received at this hospital are suffering from diseases of the gastro-intestinal tract, most of them being cases of chronic enteritis or dysentery. The results achieved in the treatment of these cases have been far from discouraging, as will be seen by the low rate of mortality during the period of time since the hospital has been in operation.

The total number of patients admitted to the hospital during the fiscal year was 5,587, divided as follows:

Regulars, 2,813; volunteers, 2,278; discharged soldiers, 496.

The patients in this hospital have been derived from the following sources: Transports from the Philippine Islands, admissions from the model camp, Presidio, San Francisco, Cal., admissions from civil life in the case of discharged soldiers, and readmissions from various sources.

The number of patients received from transports has been 3,513.

The following is a tabulated statement of the transports which have brought patients to this hospital, with the date of arrival and the number of Regulars and Volunteers which were entered in the hospital as patients:

Transport.	Date of arrival.	Regulars.	Volunteers.	Total.
Hancock	July 14, 1900	104	153	257
Warren	July 28, 1900	27	18	45
Logan	Aug. 6, 1900	61	0	61
Sherman	Aug. 7, 1900	58	65	123
Thomas	Aug. 30, 1900	154	116	270
Grant	Sept. 23, 1900	141	87	228
Sherman	Oct. 19, 1900	209	137	346
Meade	Oct. 31, 1900	112	85	197
Logan	Nov. 16, 1900	127	65	192
Thomas	Dec. 2, 1900	138	62	200
Hancock	Dec. 11, 1900	116	49	165
Grant	Dec. 31, 1900	107	65	172
Sherman	Jan. 7, 1901	110	84	194
Warren	Feb. 3, 1901	59	105	164
Sheridan	Feb. 6, 1901	63	66	129
Indiana	Feb. 27, 1901	106	77	183

Transport.	Date of arrival.	Regulars.	Volunteers.	Total.
Meade	Mar. 1, 1901	24	29	53
Hancock	Mar. 12, 1901	0	18	18
Buford	Mar. 13, 1901	0	5	5
Kilpatrick	Mar. 17, 1901	177	43	220
Logan	Mar. 29, 1901	0	20	20
Thomas	Apr. 15, 1901	2	30	32
Rosecrans	Apr. 18, 1901	3	0	3
Grant	Apr. 19, 1901	91	48	139
Garonne	Apr. 20, 1901	0	9	9
Sheridan	May 18, 1901	3	40	43
Hancock	June 2, 1901	0	7	7
Pennsylvania	June 18, 1901	0	6	6
Ohio	June 21, 1901	0	9	9
Grant	June 25, 1901	0	16	16
Logan	do	0	33	33
Thomas	June 26, 1901	0	33	33
Buford	June 27, 1901	0	21	21
Kilpatrick	June 28, 1901	0	20	20
Total		1,992	1,521	3,513

During the year there have been 182 deaths, divided as follows: Regulars, 74; Volunteers, 96; discharged soldiers, 12. The cause of death in each case will be found in the report of the pathologist of the hospital.

During the year 116 patients were transferred to Fort Bayard, N. Mex., to receive treatment for pulmonary tuberculosis. These cases were divided as follows: Regulars, 81; Volunteers, 35.

One hundred and seventy-three patients were transferred to Hot Springs, Ark., (Army and Navy General Hospital) for treatment. These cases were divided as follows: Regulars, 152; Volunteers, 21.

NOSOLOGICAL INDEX OF DISEASES TREATED IN THE UNITED STATES ARMY GENERAL HOSPITAL, PRESIDIO, SAN FRANCISCO, CAL., SINCE JULY 1, 1899, TO THE END OF THE FISCAL YEAR JUNE 30, 1901.

The following nosological index has been compiled with a great deal of care from the records of the hospital. While it can not be said to be complete in every instance, it gives a general idea of the number and character of the cases which have been admitted to this hospital. It will be noticed that the total number of cases classified in this index does not equal the total number admitted to the hospital, but this is explained by the fact that the diagnoses in many of the cases admitted have been of uncertain character and have not been included in the index, although they might be included under the vague head of "undetermined diagnoses."

The index is arranged according to the divisions given in the Medical Manual:

I.—*Infectious diseases, general and local.*

Diseases.	Regulars.	Volunteers.	Total.
Scarlet fever	1	1	2
Measles	162	54	216
Variola	4	22	26
Vaccinia	36	40	76
Varicella	0	1	1
Influenza	22	1	23
Malarial fever, pernicious	2	1	3
Malarial cachexia	127	117	244
Erysipelas	4	4	8
Septicemia	1	1	2
Mumps	63	28	91
Diphtheria	8	12	20
Typhoid fever	76	131	207
Cerebro-spinal meningitis	2	0	2
Rheumatic fever	16	8	24
Malarial fever:			
Intermittent	329	314	643
Remittent or continued	51	92	143
Tuberculosis of lungs	124	99	223
Tuberculosis of other organs	5	2	7
Carcinoma	8	1	9
Sarcoma	1	0	1
Syphilis	75	42	117
Gonorrhea	69	72	141
Gonorrheal epididymitis and orchitis	46	48	94
Chancroid	133	118	251
Other diseases of this class	15	26	41
Total	1,380	1,235	2,615

II.—*Diseases of nutrition, general.*

Diseases.	Regulars.	Volunteers.	Total.
Anemia	34	19	53
Glycosuria	1	1	2
Total	35	20	55

III.—*Structural and functional diseases.*

A.—DISEASES OF THE NERVOUS SYSTEM.

Disease.	Regulars.	Volunteers.	Total.
Alcoholism:			
Acute	5	19	24
Chronic	2	14	16
Delirium tremens	3	2	5
Chorea	3	1	4
Epilepsy	20	16	36
Insanity	135	80	215
Locomotor ataxia	1	1	2
Meningitis	2	3	5
Myelitis	4	1	5
Neuritis	7	11	18
Neuralgia	15	3	18
Neurasthenia	17	6	23
Nostalgia	2	1	3
Paralysis	30	26	56
Other diseases of this class	12	7	19
Total	258	191	449

B.—DISEASES OF THE DIGESTIVE SYSTEM.

Corrosive and irritant poisons, effects of	1	0	1
Tonsillitis	79	49	128
Peritonitis, acute	0	4	4
Dyspepsia	24	10	34
Gastritis	129	123	252
Colic	4	0	4
Constipation	38	14	52
Tenia	2	7	9
Diarrhea:			
Acute	30	81	111
Chronic	153	183	336
Enteritis	94	96	190
Appendicitis	38	23	61
Dysentery:			
Acute	1	5	6
Chronic	813	815	1,628
Hemorrhage, intestinal	1	1	2
Fistula in ano	15	18	33
Hemorrhoids	57	71	128
Biliary colic and calculi	1	1	2
Jaundice, catarrhal	2	9	11
Hepatitis	3	1	4
Other diseases of this class	30	38	68
Total	1,515	1,549	3,064

C.—DISEASES OF THE CIRCULATORY SYSTEM.

Angina pectoris	4	0	4
Cardiac irritability	6	5	11
Pericarditis	4	5	9
Endocarditis	11	5	16
Valvular disease and results	50	15	65
Embolism	1	0	1
Aneurism	5	0	5
Varicose veins	9	11	20
Phlebitis	5	4	9
Other diseases of this class	11	2	13
Total	106	47	153

III.—*Structural and functional diseases*—Continued.

D.—DISEASES OF THE RESPIRATORY ORGANS.

Diseases.	Regulars.	Volunteers.	Total.
Pharynx, disease of	19	14	33
Larynx, disease of	16	9	25
Coryza	15	11	26
Bronchitis:			
Acute	110	49	159
Chronic	50	47	97
Capillary	1	0	1
Asthma	21	14	35
Pulmonary hemorrhage	1	0	1
Pneumonia:			
Catarrhal	5	10	15
Croupous	80	40	120
Pleurisy	53	25	78
Other diseases of this class	11	4	15
Total	382	223	605

E.—DISEASES OF THE GENITO-URINARY SYSTEM.

Pyelitis	1	0	1
Nephritis:			
Acute parenchymatous	21	9	30
Chronic parenchymatous	15	15	30
Cystitis	18	8	26
Enuresis	1	0	1
Hematuria	2	0	2
Prostatitis	0	2	2
Urethral stricture	11	2	13
Paraphimosis	2	2	4
Phimosis	4	22	26
Varicocele	40	38	78
Hydrocele	2	7	9
Other diseases of this class	26	15	41
Total	143	120	263

F.—DISEASES OF THE LYMPHATIC SYSTEM AND DUCTLESS GLANDS.

Adenitis	2	14	16
Lymphangitis	2	1	3
Other diseases of this class	1	2	3
Total	5	17	22

G.—DISEASES OE THE MUSCLES, BONES, AND JOINTS.

Muscular rheumatism and myalgia	96	49	145
Whitlow	1	1	2
Osteitis	2	1	3
Periostitis	5	2	7
Arthritis	14	4	18
Chronic rheumatic	14	14	28
Bunion	1	0	1
Synovitis	6	13	19
Other diseases of this class	27	23	50
Total	166	107	273

H.—DISEASES OF THE INTEGUMENT AND SUBCUTANEOUS CONNECTIVE TISSUE.

Corns and warts	0	5	5
Ingrowing nails	19	7	26
Abscess	35	32	67
Furuncle	5	16	21
Carbuncle	0	1	1
Ulcer	20	34	54
Dermatitis from poisonous plants	3	9	12
Herpes	3	3	6
Eczema and pemphigus	6	8	14
Impetigo	1	1	2
Scabies	1	1	2
Other diseases of this class	1	0	1
Total	94	117	211

III.—*Structural and functional diseases*—Continued.

I.—DISEASES OF THE ORGANS OF SPECIAL SENSE.[1]

Diseases.	Regulars.	Volunteers.	Total.
DISEASES OF THE EYE.			
Lids, diseases of	0	2	2
Conjunctivitis:			
Acute	10	14	24
Chronic	3	2	5
Corneitis	0	2	2
Sclerotitis	4	0	4
Iritis	6	6	12
Retinitis	3	6	9
Asthenopia	1	0	1
Trachoma	2	1	3
Corneal ulcer	0	1	1
Opacities of the vitreous	0	1	1
Cataract	2	2	4
Optic neuritis	1	0	1
Corneal opacities	5	1	6
Total	37	41	78
DISEASES OF THE EAR.			
Diseases of the external ear	15	66	81
Diseases of the tympanum	1	1	2
Otitis media, suppurative	45	58	103
Deafness	2	4	6
Total	63	129	192
DISEASES OF THE NOSE.			
Nasal catarrh, chronic	3	0	3
Rhinitis	3	4	7
Total	6	4	10

[1] The nosological index of diseases of the eye, ear, nose, and throat include only those to January 1, 1901. The index of these diseases which have occurred since January 1, 1901, will be found in the portion of this report upon the work done in the eye, ear, nose, and throat clinic.

IV.—*Accidents and injuries.*

A.—GENERAL INJURIES.

Disease.	Regulars.	Volunteers.	Total.
Burns and scalds	3	3	6
Exhaustion from disease	4	15	19
Insolation	23	15	38
Total	30	33	63

B.—INJURIES TO SPECIAL PARTS.

Contusions and sprains	37	26	63
Fractures	28	30	58
Hernia:			
Inguinal	80	60	140
Other	14	11	25
Orchitis, from injury	7	5	12
Wounds:			
Contused	8	7	15
Incised	11	8	19
Lacerated	17	9	26
Punctured	0	3	3
Gunshot	189	321	510
Other local injuries	6	2	8
Total	397	482	879

V.—*Unclassified.*

Disease or injury.	Regulars.	Volunteers.	Total.
Unknown	9	5	14
Convalescent	157	108	265
Total	166	113	279

From the consideration of the nosological index it will be seen that the diseases of the gastro-intestinal tract have furnished a very large percentage of the total number of patients admitted to the hospital. Next in frequency to those diseases come the malarial fevers, while the venereal diseases follow the malarial fevers in order of frequency.

Considered in the divisions as given in the Medical Manual, diseases of the digestive system stand first in order of frequency; infectious diseases, second; accidents and injuries, third; diseases of the respiratory organs, fourth; diseases of the nervous system, fifth; diseases of the muscles, bones, and joints, sixth; diseases of the genito-urinary system, seventh; diseases of the integument and subcutaneous connective tissue, eighth; diseases of the circulatory system, ninth; diseases of the ear, tenth; diseases of the eye, eleventh; diseases of general nutrition, twelfth; diseases of the nose, thirteenth.

Rate of mortality.—The total number of cases autopsied at this hospital since July 1, 1899, has been 252. The following table, compiled from 246 autopsy records, gives a good general idea of the rate of mortality of this hospital from the diseases mentioned. The deaths numbered under the diseases selected include all deaths from those diseases:

Cause of death.	Number of cases in hospital.	Number of deaths.	Mortality.
			Per cent.
Chronic dysentery, follicular, pseudo-diphtheritic, gangrenous, and amœbic	1,634	113	6.9
Chronic enteritis	637	12	1.9
Pulmonary tuberculosis	223	40	18
Lobar pneumonia	120	24	20
Broncho-pneumonia	15	9	60
General miliary tuberculosis	5	5	100
Acute septicæmia	4	4	100
Empyema	40	4	10
Acute nephritis	30	5	16.66
Pernicious anæmia	5	5	100
Acute peritonitis	4	2	50
Acute menengitis	5	3	60
Chronic nephritis	30	3	10
Typhoid fever	207	4	1.9
Valvular disease of heart	65	4	6.15
Carcinoma	2	2	100
Pernicious malarial fever	3	2	66.66
Cerebral apoplexy	1	1	100
Cirrhosis of liver	1	1	100
Alcoholism	40	1	2.5
Fracture of skull	1	1	100
Primary tuberculosis of kidney	1	1	100

The consideration of this table shows several points of interest. The mortality rate of chronic dysentery, including all forms, has been low, despite the fact that many of these cases—in fact, the majority—came to the hospital very much debilitated from repeated attacks of dysentery, and in a large number of instances so weak and emaciated that no hopes were entertained of their recovery. The treatment of chronic dysentery at this hospital has varied considerably. In the amœbic cases, which have shown a very high percentage of recovery here, the treatment habitually used has been quinine injections. It has been found that under this form of treatment the amœbæ quickly disappeared from the stools in most instances, as well as blood and mucus, and recovery took place more or less rapidly. In a few instances quinine injections seemed to do no good, the amœbæ persisting, and most of these cases finally resulted in death. In the forms of dysentery other than amœbic the treatment by sulphate of sodium or magnesium sulphate has been used in the more

acute cases with much success, and often in the chronic cases the treatment by magnesium sulphate has resulted in many cures. Injections of nitrate of silver have been used rather extensively and in many instances with good results. One of the greatest objections, however, to this method of treatment is the intense pain which the injections cause, and which, in some instances, has been so severe as to preclude their use. Bismuth subnitrate and opium have not been used to any great extent at this hospital in the treatment of dysentery.

One of the most difficult things in the treatment of cases of this kind is the diet. Some cases seem to be unable to take or absorb nourishment in any form. Quite a number of the recent albuminoid preparations have been tried, and in some instances have seemed to benefit the patient; but, as a rule, it has been found that peptonized milk acts fully as well as any of the proprietary preparations. In certain cases such preparations as "Tropon" and "Plasmon" have benefited patients who were unable to retain or absorb any other article of food; but these cases were rare and did not differ clinically from other cases which retained the ordinary articles of liquid diet. These preparations are undoubtedly useful in selected cases, but the majority of the patients to whom they were given expressed more or less dissatisfaction with them on account of their taste and mode of preparation and were better satisfied with the ordinary liquid diets. It is safe to say that the ideal diet for cases of chronic enteritis and dysentery is yet to be discovered.

Broncho-pneumonia.—The mortality was 60 per cent in broncho-pneumonia. It appears rather high, but if the class of cases in which this disease occurred be considered it will not be found to be so. All of the cases of broncho-pneumonia which have entered this hospital have followed measles, and it is a well-known fact that in such cases the mortality in adults is excessive. Nearly all of the cases developed after the infection of measles had apparently disappeared and were probably due to exposure brought about by the carelessness of the patient.

Lobar pneumonia.—Lobar pneumonia has shown a mortality of 20 per cent at this hospital. This is a very low mortality rate when the number of cases is considered in which an alcoholic history was obtained. Nearly 30 per cent of the cases which have occurred here gave a history of a prolonged alcoholic debauch just before the onset of the pneumonia, and about 40 per cent more gave a history of excessive use of alcohol at various periods of time, ranging from three months to a year or more. Most of the cases occurred in young men of very robust constitution, many of them being, if anything, overweight. In such cases where both the alcoholic history and the physical condition of the patient is against recovery, a very high mortality rate is to be expected. A mortality rate of 20 per cent at this hospital should therefore be considered remarkably low, considering the character of the cases, as in private practice, where the conditions are most favorable, the mortality rate of lobar pneumonia is generally estimated at 15 per cent and in hospital practice 25 per cent.

Pulmonary tuberculosis.—The mortality rate of pulmonary tuberculosis has been 18 per cent. This mortality rate, however, does not amount to very much, as most of the cases of pulmonary tuberculosis which could travel were sent almost immediately to Fort Bayard, N. Mex., for treatment, and only those who were unable to leave their beds have been retained in this hospital. It would be impossible to give a correct mortality in the cases of pulmonary tuberculosis which passed through this hospital without a knowledge of the history of the cases at Fort Bayard.

Pernicious malarial fever.—The mortality rate of 66.66 per cent in cases of pernicious malarial fever is rather high, but as only three cases have occurred at this hospital, and two of them were very obscure as regards to their symptomatology, it is hardly a fair estimate of the mortality rate in this disease, as, without doubt, had the cases been recognized sooner, the result might have been different.

As would have been expected, the mortality rate in miliary tuberculosis, acute septicæmia, pernicious anæmia, carcinoma, and cerebral apoplexy has been 100 per cent.

Empyema.—The mortality rate in empyema at this hospital has been 10 per cent. Nearly all the cases occurred as a sequela of pneumonia. Cultures made from the exudate in the fatal cases have shown as a rule streptococci and staphylococci. One of the four fatal cases gave a culture of the diplococcus pneumoniæ of Sternberg.

Acute nephritis.—The mortality rate in acute nephritis has been 16.66 per cent, which is rather high, but it should be remembered that in almost every case which has died from this disease, it has occurred as a complication of prolonged enteritis or dysentery. The patients, therefore, were very much depleted as regards their general condition and could not resist the inflammation of the kidneys. In almost every case dying of acute nephritis, it was found at autopsy that there had been a previous

severe inflammation of some portion of the intestinal tract, most often of the ileum and a portion of the large intestine.

Typhoid fever.—The mortality rate of typhoid fever has been exceedingly low, being only 1.9 per cent. From a comparison of the mortality rates of this disease in various large hospitals throughout the country, it is believed that this is the lowest mortality rate, considering the large number of cases, which has ever been recorded. The treatment prescribed was that of cold baths and liquid diet, with an addition in some cases of intestinal antiseptics, such as salol and calomel. Treatment has differed in no way from that ordinarily prescribed at most of the large hospitals in this country, and it is probably true that careful nursing and the strong constitution of most of the patients contributed more to the successful results than the medical treatment.

Primary tuberculosis of the kidneys.—During the year one case has occurred of this very rare disease and this case proved fatal before any portion of the body was invaded by the infection. While tuberculosis of the kidney associated with tuberculosis of other organs, and secondary to infection in other organs, is of a very common occurrence, the primary involvement of the kidney and death following from that involvement before the infection has spread, is very rare. In this case both kidneys contained numerous tubercular abscesses and tubercules. The urine, before death, showed the presence of tubercle bacilli and of pus and blood. The patient had never presented any symptoms of tuberculosis of other organs and complained simply of some pain over the lumbar region, and of passing blood-stained urine. He died shortly after entering the hospital, from uremic poisoning. At autopsy the condition briefly described above was found in the kidneys, but no other organ in the body showed any trace of tubercular infection.

Certificates of disability.—An important function of the hospital has been the discharge of disabled soldiers on surgeon's certificate of disability. In the execution of the work, much of which was done at a time when there was urgent necessity for making room for incoming patients, great care has been taken to guard against the discharge of soldiers whose condition was such as to encourage the belief that they might be of future usefulness to the service, and in the case of volunteers that they might ultimately recover without permanent disability. The method was as follows:

The ward officers, after sufficient observation of the cases, made such recommendations respecting the disposition of the same as they thought indicated, upon a form for the purpose. A soldier recommended for such discharge was referred to a regular medical officer of experience, whose duty it was to carefully examine and observe him, and when satisfied that the disability was permanent, to have prepared under his supervision the necessary certificates, which were sent to the commanding officer for his action.

The frequent lack of notation in the descriptive list or other official papers of the manner of incurrence of the wound, injury, or disease that resulted in the disability, has been an annoying obstacle in the way of thoroughly satisfactory preparation of these certificates. In such cases, when impracticable to obtain the desired information from noninterested parties, it has often been necessary to rely on the sworn statement of the soldier himself.

During the fiscal year 951 soldiers were discharged on surgeon's certificate of disability. From the statement below, giving the number of discharges by months, it will be seen that the certificates of a large part of the 951 were made when transports were arriving at close intervals, bringing sick in large numbers, thus taxing to the utmost the capacity of the hospital and the energy of its personnel.

Month.	Regulars.	Volunteers.	Total.
July	31	24	55
August	34	55	89
September	36	56	92
October	93	35	128
November	78	41	119
December	80	26	106
January	64	30	94
February	35	45	80
March	30	43	73
April	34	18	52
May	27	4	31
June	18	14	32
Total	560	391	951

The following tabulated statement, arranged according to the Medical Manual, shows the cause of discharge for disability from July 1, 1900, to June 30, 1901:

Infectious diseases:	
Malarial cachexia	14
Pulmonary tuberculosis	20
Tubercular adenitis	4
Tubercular epididymitis	1
Syphilitic necrosis and abscess	4
Total	43
Diseases of the nervous system:	
Chorea	3
Neurasthenia	3
Epilepsy	15
Loss of memory	1
Neuritis, alcoholic	2
Osteo-myelitis	1
Locomotor ataxia	1
Paralysis, local and general	27
Neuritis	8
Morphine habit	2
Spinal sclerosis	2
Epileptiform convulsions	1
Tabes dorsalis	1
Cephalalgia	21
Melancholia	1
Total	89
Diseases of the digestive system:	
Chronic dysentery	31
Caries of teeth	37
Stricture of rectum	1
Deranged nutrition	4
Gastric dilatation	1
Gastro enteritis	12
Chronic diarrhea	15
Chronic gastritis	1
Chronic dyspepsia	1
Entero colitis	1
Disease of the liver	2
Chronic gastric ulcer	1
Chronic peritonitis	1
Hemorrhoids	2
Total	110
Circulatory system:	
Aortic insufficiency	6
Myocarditis	1
Phlebitis	9
Cardiac, valvular disease	21
Exophthalmic goiter	4
Tachycardiac arhythmia	18
Endocarditis	5
Varicocele	2
Varicose veins	3
Total	69
Respiratory organs:	
Asthma	14
Dyspnœa	3
Chronic pleurisy	5
Lung consolidation	2
Chronic laryngitis	1
Nasal catarrh	1
Total	26

Gunshot wounds and effects	248
Injuries:	
Hands and arms	10
Ventral hernia	10
Inguinal hernia, refusing operation	44
Heat exhaustion	1
Flat foot	12
Knife wounds	15
Cataract	1
Periostitis	1
Chronic synovitis	7
Subluxation	4
Injury, feet	4
Fracture	39
Kyphosis	3
Necrosis	2
Ankylosis	4
Total	157
Diseases of the eye and ear:	
Defective vision	58
Otitis media	104
Total	162
Disease of the muscles, bones, and joints:	
Rheumatism	18
Psoas abscess	1
Local asphyxia	1
General muscular tremor and atrophy	2
Contraction palmar fascia, hand	1
Total	23
Genito-urinary organs:	
Nephritis	6
Cystitis	2
Hydrocele	1
Urethral fistula	1
Total	10
Miscellaneous:	
Hammer toe deformity	2
Abdominal tumor	1
Bunions of feet	6
Abdominal aneurism	1
Rectal prolapsus	1
Ischio-rectal abscess	1
Diabetes mellitus	1
Total	13

The following circulars regarding surgeon's certificates of disability have been published during the year:

"Hereafter, including to-day, each medical officer at this hospital having charge of wards will submit to the executive officer on or before 2 o'clock p. m. two sets of certificates of disability, commencing with the permanently disabled volunteers and such disabilities as are absolutely palpable, such as hernia, perforation of the drum, structural changes of the eye, or wounds.

"Whenever a medical officer finds his material for certificates exhausted he will, in place of certificates, submit a report to that effect to the executive officer in order that the commanding officer may make personal inspection with a view of possible detection of further cases suitable for discharge."

"The following instructions relative to the preparation of surgeons' certificates in cases of disability are necessitated, viz:

"1. The surgeons should carefully read the instructions on the blanks and comply with them.

"2. The first part should give the reason why a soldier is incapable of performing the duties of a soldier, and not a clinical history.

"3. An 'opinion' as to 'cause' of disability is required. This does not mean legal evidence, but an opinion formed from questioning the patient and weighing the value of his answers by other information obtainable, in the same manner as an opinion would be given in life insurance or accident policy.

"4. The question of whether incurred in line of duty is often difficult to answer.

"As a general rule it must be assumed that any disability was incurred in line of duty, unless it is clearly established that it existed prior to enlistment and was not discovered at that time, or was the result of the soldier's own unlawful act. Even then an aggravation due to the service resulting in disability would entitle the soldier to a certificate of 'In line of duty.'

"A disability contracted when on temporary absence, such as a pass, would be in line of duty, while if contracted on leave or furlough is not in line of duty.

"Careful attention should be paid to the degree of disability, and liberality may be exercised, as the degree in case of pension is fixed by the pension boards, and the opinion of the surgeon is not final.

"6. The certificates must be in the surgeon's own handwriting and should be written as legibly as possible."

EYE, EAR, NOSE, AND THROAT CLINIC.

On account of the large number of soldiers who present diseases of the eye, ear, nose, and throat, it has been necessary to establish a clinic in the hospital for the treatment of these diseases.

The work done in this clinic during the fiscal year is given below.

The total number of cases examined in the clinic during the six months since January 1, 1901, has been 501, divided as follows:

Regulars	264
Volunteers	214
Discharged soldiers	4
Civilians	19
Total	501
Total number of diseases of the eye	246
Total number of diseases of the ear	149
Total number of diseases of the nose and throat	132
Total diseases of all kinds	527

It will be noticed that the total number of these slightly exceeds that of the total number of cases examined, but this is explained by the fact that some cases present disease of more than one organ and have been counted in the list more than once.

DISEASES OF THE EYE.

The following is a nosological table of diseases of the eye which have been treated in the clinic since January 1, 1901:

Myopia	13
Hypermetropia	9
Compound myopic astigmatism	11
Compound hypermetropic astigmatism	6
Anisometropia	3
Convergent strabismus	3
Conjunctivitis:	
Simple	49
Membraneous	2
Gonorrheal	2
Granular—	
Acute	4
Chronic	13
Chemosis of conjunctiva	2

Chalazion	5
Blepharitis ciliaris	7
Ulcerative keratitis	2
Corneal opacities	16
Kerato-scleritis	2
Pterygium	9
Cataract:	
Traumatic	1
Senile	1
Incipient	1
Iritis:	
Rheumatic	2
Syphilitic	7
Sequel to variola	1
Vitreous opacities	2
Hemorrhage into the vitreous	1
Retinitis:	
Simplex	1
Proliferating	1
Pigmentosa	2
Hemorrhage into retina	1
Choroido retinitis	4
Choroiditis	7
Oedema of retina	1
Atrophy of optic nerve	5
Cellulitis, orbital	2
Dacryo-cystitis:	
Acute	2
Chronic	2
Stenosis nasal duct	1
Supraorbital neuralgia	2
Paralysis of ocular muscles	1
Abscess external canthus (from sting of insect)	1
Enucleation of eyeball	3
Malingering (vision)	36
Total	246

DISEASES OF THE EAR.

The following is a nosological table of diseases of the ear treated in the clinic since January 1, 1901:

Eczema external auditory canal	1
Furuncles external auditory canal	3
Impacted cerumen	10
Mastoiditis	3
Myringitis, acute	1
Tubal catarrh:	
Acute	5
Chronic	17
Otitis media:	
Nonsuppurativa, acuta	7
Suppurativa, acuta	22
Nonsuppurativa, chronica	15
Suppurativa, chronica	59
Malingering (hearing)	6
Total	149

DISEASES OF THE NOSE AND THROAT.

The following is a nosological table of diseases of the nose and throat treated in the clinic since January 1, 1901:

Eczema, nose	1
Deflection nasal septum	5
Nasal hemorrhage	2
Nasal polypus (sessile)	1

Rhinitis:	
Acute	10
Chronic hypertrophic	5
Syphilitic necrosis septum	2
Tonsillitis:	
Acute parenchymatous	3
Acute croupous	2
Follicular	2
Hypertrophy tonsils	7
Pharyngitis:	
Acute catarrhal	4
Chronic catarrhal	13
Syphilitic ulceration pharynx	1
Naso-pharyngitis:	
Acute	19
Chronic	33
Adenoids, pharyngeal vault	2
Laryngitis:	
Acute catarrhal	15
Tubercular	2
Syphilitic	1
Papilloma vocal chord	1
Paralysis vocal chord	1
Total	132

ETIOLOGY OF DISEASES OF EYE, EAR, NOSE, AND THROAT.

It is very difficult in most of these cases to state positively their etiology, on account of the imperfect histories given by the patients and that it can not be stated with certainty whether or not many of them were contracted prior to enlistment. In a few, however, it is possible to make a more decided statement in regard to the etiology.

Diseases of the eye.—The corneal opacities were in most instances due to gonorrheal conjunctivitis. Most cases of conjunctivitis and pterygium are undoubtedly due to the intense glare of the tropical sun. This factor also caused most of the cases of choroiditis and choroidoretinitis.

In cases giving a history of pernicious malarial fever, ophthalmoscopic examination has revealed deposits of pigment in the retina. In some instances the particles are so fine as not to interfere with the vision. In others the pigment is deposited in larger amount, resulting in diminished vision of 50 to 60 per cent.

The majority of cases of iritis were directly traceable to syphilitic infections. Most of these infections were contracted either in San Francisco, Honolulu, or Nagasaki; very few cases originating in the Philippines. The same can not be said, however, of the infections due to gonorrhea.

Malingering.—Among a certain class of soldiers the claiming of disability due to diseases of the eye or defect in vision is common. Many of these men realize how difficult it is without the proper facilities for intraocular examinations to detect the malingering. This is also true of claims for defect of vision, for without the use of test lenses and the ophthalmometer, it is often impossible to positively state whether there is a defect of vision or not, and even with these aids it often requires repeated examinations to detect the malingerer. The complete equipment of the eye clinic at this hospital has been of the utmost value in detecting malingering.

Disease of the ear.—Eczema and furunculosis of the external auditory canal are due, in a large proportion of the cases, to bathing in the filthy streams of the Philippines, which are laden with organic matter and human excrement. This is deposited in the external auditory canal and becomes decomposed owing to the heat and moisture of the climate and the unsanitary habits of the soldiers, giving rise to eczema and formation of furuncles.

Mastoiditis is due to the extension of the middle ear disease, a great many cases recovering without operation. The nonsuppurative form of otitis media has been found to be often due to the excessive use of quinine in cases suffering from malarial infection. The suppurative form of otitis media was almost invariably found to be a sequel of typhoid fever, measles, or variola.

Disease of the nose and throat.—The etiology of these diseases does not differ from the same diseases occurring in any other class of patients.

The prognosis and treatment of disease of the eye, ear, nose, and throat does not differ in the army from the same class of cases occurring in civilian life, save in unimportant particulars.

BACTERIOLOGICAL LABORATORY.

The report of the bacteriological laboratory, prepared by the pathologist of the hospital, is here inserted. During the year the blood and urine of every case entering the hospital has been examined, and in addition the faeces of every case diagnosed as chronic dysentery and the sputum of every case in which any lung symptoms were present. The following orders and circulars concerning the work of the laboratory have been issued during the year:

"All cases entering this hospital with a diagnosis of malarial fever, malarial cachexia, or in which malarial infection is suspected, should not have the blood examined until at least a week has elapsed after entry, unless active symptoms are present before that time. Quinine should not be administered to any such case until the blood has been examined and the diagnosis confirmed by the pathologist, except in pernicious cases, or where, for some complication, quinine is necessary."

"In cases of suspected tuberculosis, in which, even after repeated examination of the sputa, no tubercle bacilli are demonstrated, the ward officer should recommend transfer to Fort Bayard, provided the physical signs are sufficient to warrant the diagnosis."

"Cases with a diagnosis of malarial fever, in which the parasite is found in the blood, should be treated with quinine until all active symptoms have disappeared. Quinine should then be discontinued and nuclein given. An examination of the blood of all cases upon nuclein should be requested by the pathologist once a week, as long as this remedy is being administered. This is not imperative, and will only be complied with when there may be no detriment resulting from it for the patient."

"Circular No. 5 is modified to read that blood examination of new patients should first be made on bed cases, and in these cases repeated once a week, or oftener if necessary."

"The attention of the medical officers at this hospital is called to the large number of patients whose blood examination shows malarial parasites, but in which no clinical signs are present. Since August 20 there have been 15 such cases. As it is hardly probable that in so large a number there has been no rise of temperature during the twenty-four hours, it is recommended that when possible the temperature of all patients giving a history of malarial infection be recorded every twenty-four hours, as in the malarial fevers of tropical origin the morning and evening temperature can not be relied upon."

"The attention of medical officers of this hospital is called to circular No. 5, section 4, dated February 7, 1900. This paragraph is amended to read as follows:

"*Examination of faces.*—The faeces of every case suffering from chronic dysentery or diarrhea, and having more than two bowel movements a day, will be submitted to the pathologist for examination at least once, and as often thereafter as he or the medical officer may direct. This examination is for the purpose of determining whether or no the amoeba coli is present, and, if so, that the proper treatment by quinine enemas be at once instituted."

"In case of death at this hospital the clerk in the officer of the day's room is to send a written notification to the pathologist as soon as possible."

"The card furnished to the pathologist should be filled out in every particular and attached to the body before it is sent to the morgue."

REPORT OF THE BACTERIOLOGICAL LABORATORY, UNITED STATES ARMY GENERAL HOSPITAL, PRESIDIO, SAN FRANCISCO, CAL., FOR THE FISCAL YEAR ENDING JUNE 30, 1901, BY CONTRACT SURG. CHARLES F. CRAIG, UNITED STATES ARMY, DIRECTOR OF THE LABORATORY.

I have the honor to submit the following report of the work done in the bacteriological laboratory of this hospital for the fiscal year ending June 30, 1901:

The total number of examinations made in the laboratory has been 15,260, which were divided as follows:

A. Examinations of blood	5,815
B. Examinations of urine	5,935
C. Examinations of sputa	1,251
D. Examinations of fæces	1,116
E. Examinations of post-mortem material	798
F. Miscellaneous examinations	345
Total examinations	15,260
G. Autopsies	163

(A) EXAMINATIONS OF BLOOD.

Five thousand eight hundred and fifteen specimens of blood were examined for the parasites of malarial fever, of which 643 were positive and 5,172 were negative. It will be noted that there is a very large negative result, which is due to the fact that every patient received in this hospital has an examination of the blood made, whether clinical symptoms of malaria are present or not. This practice has been of the utmost value, as by it over 150 cases of malaria were discovered which presented no symptoms of the disease at the time the blood was examined, but in which malarial parasites were found.

The 643 positive cases may be divided as to their etiology as follows:

Cases due to the benign tertian parasite	220
Cases due to the quartan parasite	3
Cases due to the estivo-autumnal parasites	400
Cases due to the tertian estivo-autumnal parasite	20

Tertian infections.—Two hundred and twenty specimens of blood contained the tertian parasite, of which 140 were single infections and 80 were double infections. There was nothing remarkable noticed about the tertian malarial parasite in soldiers returning from the Philippine Islands. As a rule, however, the infections were much more resistant than is the case in similar infections in this country. Many of these cases suffered relapses while in the hospital, although quinine was administered very conscientiously.

Quartan infections.—There were only three quartan infections found during the year, which agrees well with the known rarity of the quartan type of malarial infection.

Estivo-autumnal infections.—Four hundred specimens of blood showed the presence of the estivo-autumnal parasite. Of these 327 were due to the tertian estivo-autumnal parasite and 64 to the quotidian estivo-autumnal parasite. Nine cases were combined infections.

In the study of these parasites I have paid especial attention to the division between the tertian and quotidian forms, and careful study has only increased my conviction that two forms of the estivo-autumnal parasite exist, and can be differentiated both microscopically and clinically. This has not been the experience of most American observers, although the Italian schools have accepted these two divisions. As the morphological differences in the two parasites are not easily distinguished without some guide to their study, I shall here note briefly the structure of each and the diagnostic features of interest.

The quotidian estivo-autumnal parasite.—This form of malarial parasite completes its development in twenty-four hours as a rule. The parasite appears first as a very minute ring-shaped or round hyaline body, actively ameboid, within the red blood corpuscle. The outline of the organism is very indistinct, and were it not for its active ameboid movement it would be very easily overlooked. The ring form is usually perfectly circular when at rest, the center appearing of the same color as the corpuscle within which it lies. The organism is not very refractive and its outline is not sharply cut. When in motion it often appears triangular in shape, the movement consisting of a rapid waving motion of its border and the shooting out of minute protoplasmic prolongations, which are retracted almost as quickly as thrown out. The motion is not sluggish, but very rapid. Sometimes the ring form is lost, the organism becoming a pale hyaline disk. The movement is very erratic, and there are long periods of repose during which the ring form is retained. The organism is very small and never grows to occupy more than one-sixth of the corpuscle. The corpuscle containing the parasite is smaller than those surrounding it; presents a shrunken, wrinkled appearance, and is dark green in color. Often two or more parasites are seen within one corpuscle. There is no signet-ring appearance so common in the malignant tertian parasite. It is in this form of estivo-autumnal fever that the red corpuscles are most rapidly destroyed, and in pernicious cases almost every corpuscle in a microscopic field will be seen to contain a parasite. While the ameboid movement is not as constant as in the tertian parasite, it is more rapid and has to be watched for carefully.

The features to be noticed in the hyaline stage of the quotidian estivo-autumnal parasite are its minute size, never more than one-sixth the size of the red corpuscle; its indistinct outline; the rapidity of its movement. This stage is seen in the circulating blood best during or immediately after a paroxysm.

The pigmented stage.—Just prior to pigmentation the parasite becomes a little larger, loses its ring form, and becomes more refractive and sharply defined, but not as much so as in the malignant tertian parasite. In this parasite I have never observed

a pigmented ring, the rule being that before pigmentation the ring form is lost. The pigment appears as a single, or at the most, two granules, either in the center or at one side of the parasite, and is always perfectly motionless. Sometimes the pigment appears as a rather coarse, irregular block, situated in the center of the parasite, and I have considered such an appearance as denoting the approach of a segmentation. The infected corpuscle is always shrunken, greenish in color, and often crenated. Often, also, the hemoglobin seems to have retracted around the parasite. At this stage it is never more than one-fourth the size of the corpuscle. The chief points of interest at this stage are loss of ring form before pigmentation, lack of motion of pigment granules, and changes in the infected corpuscle. Pigmented forms are by no means rare in the circulating blood and are most numerous just before or during a paroxysm. The pigment is dark red or black in color. Ameboid motion is lost.

The segmenting stage.—This stage is rarely observed in the circulating blood. I have only observed segmenting bodies three times in over 100 cases of quotidian estivo-autumnal fever, and only in the pernicious type. In blood from the spleen, or in smears from that organ taken after death, segmenting forms are common. In the parasite which has become pigmented little change is noticed prior to the segmentation, save that the pigment is collected in a solid block at the center of the organism, while its protoplasm has become very finely granular in appearance. The pigment may be situated at one side, and the parasite is always round or oval in shape. As segmentation commences, faint radial striations can be detected starting from the center, and soon the organism breaks up into from six to eight minute, round, or oval segments. Marguerite forms are rare, irregular segmenting forms being the rule. A peculiarity of the process of segmentation in this form of the parasite is that it occurs generally inside of the red corpuscle before its entire destruction. In all of the cases in which I have observed segmenting forms in the circulating blood, segmentation had occurred within the corpuscles, and this is one of the characteristic phenomena observed in the life cycle of the quotidian estivo-autumnal parasite. The segmenting bodies are most common just before or during a paroxysm. The chief points of interest at this stage are the granular appearance of the parasite, the occurrence of segmentation within the red corpuscles, and the small number of segments.

The tertian estivo-autumnal parasite.—This is the most common parasite associated with estivo-autumnal fever, and is the one that has been the most studied and is the best known.

The hyalin stage.—Like the quotidian parasite, the first stage in the development of the tertian organism consists of a round hyaline ring or disk, but several important differences are to be noted, i. e., the ring is larger, being from one-third to one-fourth the size of the corpuscle. It is irregular, presenting an enlargement at some portion of its circumference, giving it the so-called "signet ring" appearance. It is highly refractive and is sharply cut, looking as though it had been punched out of the corpuscle; its protoplasm is clear and homogeneous; its ameboid movements slow and sluggish as compared with the quotidian parasite. The ring form is often lost, a clear hyaline disk resulting. The changes in outline are very marked, and it is much easier recognized than is the quotidian parasite. Only very rarely does more than one organism invade a single corpuscle, which is common in the quotidian form. The infected corpuscle is greenish in color and smaller, but it is not so markedly affected as in the quotidian.

The pigmented stage.—In the course of twenty to twenty-four hours, during which time the hyaline body has been ameboid, a few fine pigment granules make their appearance within the ring, generally in the enlarged area at one portion of its circumference, thus giving the organism a still greater resemblance to the signet ring; the ameboid movement continues and the pigment granules are often seen to be in a rapid vibratory motion. The pigment is reddish in color and is present in larger amount than in the quotidian parasite. The organism gradually loses its ring form and becomes larger, sometimes occupying one-half of the corpuscle. At the same time it becomes more clearly defined, its protoplasm more refractive and faintly granular in appearance. The ameboid motion still continues, though very sluggishly, and the pigment tends to collect in a solid block, which has a marked vibratory movement. The pigmented form is somewhat rare in the circulating blood, but blood from the spleen will show great numbers of them. The chief points of interest are appearance of pigment in the ring form, sharply-cut outline and granular protoplasm, motility of the pigment granules, and larger size.

The segmenting stage.—In about forty-eight hours the parasite has grown to be one-half to two-thirds as large as the red corpuscle; the pigment has become motionless and collected in a block near the center, and distinct radial striations are visible. The segments are larger than those of the quotidian organism, are more oval in shape, and number from ten to fifteen, or more. The segmentation usually occurs outside

of the corpuscle. I have observed segmenting bodies but once in the peripheral circulation. The parasite is very refractive, sharply outlined, and the protoplasm is granular.

One of the most characteristic features of the malignant tertian parasite, after the ring form has been lost, is the peculiar refractive, finely granular appearance of the protoplasm, resembling very closely that of the crescents. The pigment is also in finer particles and there are more of them.

Crescentic forms of the estivo-autumnal parasite.—Crescents are developed in the life cycle of both varieties of the estivo-autumnal parasite, and their morphology differs in a few particulars. The tertian estivo-autumnal crescent is large, very slender, with pointed extremities, very refractive, and seldom shows a double outline. Its protoplasm is finely granular, and the pigment large in amount and in the form of slender rods.

The quotidian estivo-autumnal crescent is much shorter and plumper than is the tertian, sometimes being very small. Its extremities are never pointed, but instead are rounded, and it always presents a distinct double outline. The protoplasm is less granular, and in the inclosed pigment is smaller in amount and is in the form of dots.

Presence of the quotidian parasite in the blood in relation to the attack.—During the acme of the elevation of the temperature and the sweating stage the small ameboid parasites are found in the blood within the red corpuscles. The number of the infected corpuscles vary greatly, some cases showing only one or two in the whole specimen, while in others every microscopic field will show several. At this stage the parasites are always unpigmented and often show no ameboid motion for longer or shorter periods of time.

During the afebrile stage the blood will show, besides the ring forms, a few, or many, as the case may be, of small pigmented bodies, generally circular in shape and containing one or two small pigment dots.

Just before the onset of the paroxysm, and often during the initial rise of the fever, larger pigmented forms are present, the pigment generally being collected near the center of the parasite, while the infected corpuscles are very brassy in appearance. The segmenting forms, as has been noted, are only very rarely seen in the circulating blood. In typical cases of quotidian estivo-autumnal fever, or where there is an infection with more than one group of parasites, the presence of the various forms in the blood become irregular or hyaline, and the pigmented forms may be observed at almost any time; but there will always be found a greater number of forms which correspond to the stage of the disease as shown by the clinical chart, and often in a double infection only a very few parasites belonging to one group will be seen, while there are multitudes belonging to the other group present, and it will invariably be found that it is not the most numerous group which is responsible for the clinical symptoms present.

It is this form of the estivo-autumnal parasite which is most often found in the pernicious form of the disease, but it is rare when compared to the form to be described next. The great majority of the cases of remittent malaria occurring in our soldiers in Cuba, and, so far as I have observed, in those returning from the Philippines, are caused by the malignant tertian form of the parasite, but now and again a pure case of quotidian fever will present itself, and the characteristic parasite can always be demonstrated when quinine has not been administered.

Presence of the tertian estivo-autumnal parasite in the blood in relation to the attack.—During the acme of the temperature and until the afebrile stage is reached, the small nonpigmented hyaline ameboid ring forms or disks are found in the circulating blood, with occasionally, at the acme of the fever, a larger pigmented body.

During the afebrile stage the ring forms gradually develop pigment, and the nearer the time of the onset of the paroxysm approaches the larger and more numerous do the pigmented forms become. Just before the paroxysm the blood will probably show a few pigmented forms occupying from one-half to two-thirds of the corpuscle, which is brassy in color, the hemoglobin often being retracted around the parasite. The pigment in such parasites is usually collected at the center and is immotile. Often at the commencement of a paroxysm the blood from the ear or finger will show no parasites and but a few pigmented leucocytes. However, if the blood be examined when the attack is at its height—i. e., when the fever is highest—numerous ring forms will be found. Although segmenting forms can be readily found at the onset of the paroxysm in blood from the spleen, they very rarely occur in blood taken from the ear or finger. Very many cases, both of the quotidian and tertian estivo-autumnal fevers, will be found which show at most but very few of the pigmented parasites in the peripheral blood, and often, though a few ring forms can always be found, provided they are looked for at the proper time and the examina-

tion persisted in. Nowhere does one discover the fact that "patience is a virtue" more quickly than in examining the blood of cases of estivo-autumnal fever. Often a half hour will be spent before a parasite is found, though in the majority of cases so long a search is not necessary. In estivo-autumnal fever the parasites are always most numerous during the apyrexial stage, but there are often seen mild cases of the disease in which only after tedious and repeated examinations of the blood will the parasite be found. In such cases pigmented leucocytes are almost always present, and it is justifiable to make the diagnosis of malaria from them alone.

Differentiation of the tertian and quotidian estivo-autumnal parasites.—Marchiafava and Bignami, in differentiating the tertian and quotidian parasites, call attention to the following:

1. Duration of the life cycle, twenty-four hours in the quotidian, forty-eight hours in the tertian parasite.
2. Pigmentation, greater in the tertian; the pigment motile.
3. Size of parasite, greater in the tertian.
4. Ameboid motion, more marked in tertian and longer preserved.
5. Relation of the various forms to the life cycle.

In my researches I have confirmed most of Marchiafava and Bignami's conclusions, and in the numerous cases of both varieties of estivo-autumnal fever studied have, I believe, been able to trace marked differences in every developmental stage of the parasites. I have already referred to these differences, but will recapitulate them here:

1. The hyaline stage.—The tertian estivo-autumnal parasite is larger, more clearly cut and refractive, and has a more sluggish ameboid motion than the quotidian parasite. It has often a signet ring shape, while the quotidian is perfectly round. Only one parasite is found, as a rule, in a corpuscle in a tertian infection, while in the quotidian two or more are common. The infected corpuscle is less crenated and lighter in color when infected by the tertian parasite.

2. The pigmented stage.—The tertian parasite is larger and pigmentation occurs while the ring form is still retained. In the quotidian the ring form is never pigmented. Ameboid motion is present after pigmentation, while in the quotidian it is always lost before pigmentation occurs. The tertian parasite is more sharply defined and the pigment present in larger amount is finer and is motile, while in the quotidian the pigment is always motionless and consists of one or two coarse granules. Only one pigmented tertian occurs in a corpuscle, while two or more quotidian parasites may be present in one corpuscle. The infected corpuscle is more crenated and brassy when infected by the quotidian parasite.

3. The segmenting stage.—The number of segments is greater in the tertian and the segments are more oval in outline and larger. Segmentation occurs outside the red corpuscle in the tertian estivo-autumnal parasite, while in the quotidian it occurs within the infected corpuscle.

4. The crescentic stage.—The tertian crescents are longer and more narrow than the quotidian, are more deeply pigmented, and have less of a double outline. The protoplasm of the tertian crescent is more refractive and granular in appearance.

5. The flagellated stage.—In the tertian parasite, both forms of flagellate bodies heretofore described are larger and more deeply pigmented than in the quotidian.

6. The cycle of development.—Twenty-four hours completes the cycle of development within the human body in the quotidian parasite. Forty-eight hours in the tertian.

When we add to these numerous morphological differences the typical clinical phenomena exhibited by these parasites, it must, I think, be admitted that there are at least two varieties of the estivo-autumnal parasite, a tertian and quotidian, and from my own observations I can arrive at no other conclusion.

It may be urged that the differences noted may be due to special conditions of environment, or unusual factors affecting the health of the individual, etc., and while, of course, we are unable to prove that this may not be so, yet they are so constant and harmonious that it is impossible to believe that they are accidental, and until such theories can be proven, I shall continue to believe that the estivo-autumnal malarial parasites are divided into at least two varieties, the quotidian and tertian parasite. In the examination of the blood of patients returning from the Philippine Islands who have previously suffered from malarial fever, the marked anæmia which most of them show is very noticeable. This condition is strictly a post-malarial one, due to the destruction of the blood corpuscle by the malarial parasite. Blood counts have been made of most of these cases as well as microscopical examinations. The reduction in the number of red corpuscles has been found to be, as a rule, very marked, many of the patients showing but 500,000 to 1,000,000 red cells per cubic millimeter. In the estivo-autumnal malaria the anæmia produced by repeated attacks may be extreme and also very persistent, while, unlike the tertian and quartan forms,

the regeneration of the red cells occurs very slowly. The lowest number of red corpuscles to the cubic millimeter which I have observed at this hospital has been 435,000 and the patient in this case recovered and was returned to duty in six weeks. There have been five cases of pernicious anæmia following malaria observed at this hospital in which the result was fatal. In all these cases an examination of the blood showed a marked reduction in the number of the red corpuscles and many of the corpuscles were deformed but no nucleated red cells were observed. The reduction in the hæmaglobin was equal in ratio to the reduction in the number of the red cells. The white cells were reduced in number but the large mononuclear were increased in number. At the time of the paroxysm an apparent leucocytosis is often noticed, but this is only apparent, for, as a rule, the white cells are reduced in number. A real leucocytosis is generally an indication of the presence of some complication.

As shown by the fatal cases of post-malarial anæmia which have occurred at this hospital, the anæmia following estivo-autumnal attacks is not always benign. Two forms of pernicious anæmia following malaria have been described by Bignami, Bastianelli, and Dionisi:

I. A form resembling in its clinical symptoms, blood findings, and pathology, the classical type of pernicious anæmia. In this form the blood shows poikilocytosis, the presence of microcytes, abnormal state of red corpuscles and nucleated red cells usually megaloblastas.

II. The second form is more interesting, for while it is generally fatal the blood does not show any nucleated red cells. This lack of nucleated red cells is probably due to the almost complete absence of regenerative power in the blood-forming organs, and the condition is similar to that found after profuse hemorrhage of any cause.

The cases of fatal pernicious anæmia following malaria observed here have been of the latter type, none of them showing nucleated red cells in the blood, the chief pathological feature being the marked reduction in the number of red corpuscles. This reduction has been very great in the cases observed here, ranging from 450,000 to 600,000 red cells per cubic millimeter before death occurred. Leucocytes were decreased in number, but there was often noticed an increase in the eosinophiles. The blood in these cases showed but a very slight degree of poikilocytosis, but there was a great difference in the size of the cells.

The post-mortem findings in cases of pernicious anæmia following malaria have been so similar as to be almost characteristic of this disease. The bodies were not greatly emaciated, the skin being of a yellowish hue; rigor mortis slight; the subcutaneous fat and muscular tissue well preserved. All of the cases showed an increase in fatty tissue throughout the body. The organs, as a rule, presented a very anæmic appearance, the kidneys usually being in a condition of subacute parenchymatous nephritis. The liver presented invariably a condition of fatty degeneration, and the lungs were œdematous. In several cases there was pleurisy with effusion in one or both of the pleural cavities. The amount of fat around the organs and in the greater omentum was very noticeable, but the most characteristic change present was found in the pancreas. In every case the pancreas was very markedly hypertrophied and almost white in color. The consistence of the organ was much increased and upon microscopical examination this was found to be due to the marked increase in the connective tissue of the organ. Invariably the pancreas was found surrounded by a large amount of fat. The spleen was always found enlarged, the parenchyma pigmented and greatly decreased in consistence. As a rule, the heart was found to be undergoing fatty degeneration. In all the cases the blood was found to clot very slowly and the color varied from a slight red to a yellowish red.

Microscopical examination of sections from the organs in these cases showed nothing very characteristic, save the increase in the connective tissue of the pancreas which has already been spoken of. The heart muscle showed a slight fatty degeneration in every case. The kidneys were generally found in a condition of subacute parenchymatous nephritis. The liver showed a profuse fatty degeneration, and the spleen the usual condition found in chronic malarial poisoning, i. e., marked pigmentation; the presence of a few parasites, and venous congestion of the splenic sinuses.

In all the cases dying from pernicious anæmia following malaria, the most heroic treatment failed to produce an increase in the red blood corpuscles, the patient steadily declining in strength until the fatal issue. It is impossible to say, however, whether or no a case of anæmia following malaria will be pernicious, as I have observed a large number of cases which presented very low blood counts and all the typical symptoms of the pernicious form, but which recovered under proper treatment. The prognosis, therefore, is generally good, the blood regaining its normal number of red cells in weeks or months, even after a marked reduction in number. The prognosis in a case which assumes the pernicious type is very grave, death soon occurring. The most marked reduction in number, however, is no index of the final outcome of the anæmia and should not be considered as discouraging.

Latent and masked malarial fever.—A routine examination of the blood in every case entering this hospital has demonstrated that a considerable portion of cases of malaria which have been contracted in the Philippines, present no definite symptoms, or the symptoms are masked by those of some other disease. The subject of latent and masked malarial fever has not received the attention which it deserves. If such a thing could be possible as a microscopical examination of the blood in all the cases of disease, in all parts of the world, it is safe to say that the number of cases due to the presence in the blood of the malarial parasites would be so surprising as to be almost unbelievable.

In the latent and masked malaria are included all the cases in which the parasite may be demonstrated in the blood, but in which no clinical symptoms are present, or the symptoms present are not those typical of malarial infections. A still closer definition of the terms "latent and masked" may be made as follows:

The latent malarial fevers are those in which the parasites may be demonstrated in the blood, but in which no clinical symptoms of any disease are present.

The masked malarial fevers are those in which the parasites may be demonstrated in the blood, but in which the symptoms present are those of some other disease, or are atypical.

In the first class are included those cases in which the disease is discovered accidentally through the examination of the blood as a matter of routine practice or some other purpose. Such cases have shown absolutely no symptoms of malaria, yet the parasites pursue their life cycle in the blood, but in small numbers. These cases have been rather numerous in my experience in the examination of the blood in soldiers returning from the Tropics. As a rule in such cases the parasites are few in number, but there is generally a great deal of pigment present and numerous pigmented leucocytes. The tertian estivo-autumnal parasite is the one most commonly found in this class of infection, but the quotidian form is by no means rare.

The only explanation of the fact that the development of the malarial parasites in the blood may not, for a considerable length of time, be accompanied by clinical symtoms of the disease is that they are so few in number that comparatively little of the malarial poison is produced, or else that the infected individual is very resistant to the action of the poison.

The length of time during which such latent infection may exist is not yet determined, but I have no doubt that in some cases it may be for weeks. As proof of this I have records of one case in which estivo-autumnal parasites were found in the blood for six weeks before the paroxysm occurred, repeated blood examinations being made during that time. I have records of many cases in which the parasites were found for from seven to fourteen days before clinical symptoms appeared.

The masked form of malarial infection is much more common than the latent form, and its recognition is very important from a practical point of view. Such cases have often presented no rise of temperature, and in fact the temperature is often subnormal. Nervous symptoms, such as slight headache, vertigo, neuralgia of various parts of the body, etc., or symptoms referable to some other disease may be present. The most common disease which masked malarial fever presents in soldiers returning from the Philippine Islands are acute and chronic enteritis, chronic dysentery, and tuberculosis. During the past year I have kept a record of all cases in which the malarial parasites were found in the blood, but in which no clinical symptoms were present, or the symptoms present were those of some other disease. None of these cases were diagnosed as malaria, and in many instances the prompt institution of treatment by quinine resulted in the cure of the cases which were supposed to have been due to other causes.

The total number of cases in which the malarial parasites were demonstrated, but no diagnosis of malaria made, was 172. These cases may be divided as follows:

Tertian infections	36
Estivo-autumnal infections	131
Quartan infections	1
Combined infections	4

Tertian infections.—In all the tertian infections the parasites were found undergoing their normal life cycle within the peripheral blood. The diagnoses of these cases before the blood examination, as entered upon the pathological blank, were as follows:

Chronic dysentery	12	Articular rheumatism	1
Chronic diarrhea	2	Hernia	1
Wounds	2	Acute constipation	1
Gastro-enteritis	1	Appendicitis	1
Fractures	1	Retinitis	1
Pulmonary tuberculosis	1	No diagnosis	11
Acute bronchitis	1		

From the foregoing it will be seen that chronic dysentery was the most common diagnosis made in these cases, and in most instances the patients suffered from considerable diarrhea, but in two-thirds of them treatment by quinine not only caused the disappearance of the parasites, but also cured the diarrhea. The cases in which no diagnosis was made were all cases of latent infection, the patients presenting no symptoms referable to any disease. It is probable that they had suffered from malaria in the Philippines, but under treatment had improved, and were transferred to the United States because of their debilitated condition.

Estivo-autumnal infections.—The estivo-autumnal infections, numbering 131 cases, were diagnosed as follows:

Chronic dysentery	43	Tachycardia	1
Chronic diarrhea	15	Paralysis	1
Pulmonary tuberculosis	8	Insanity	1
Wounds	3	Acute pharyngitis	1
Chronic gastritis	3	Dipsomania	1
Hernia	2	Furuncle	1
Syphilis	2	Rheumatism	1
Otitis-media	2	Chronic nephritis	1
Acute melancholia	2	Uraemia	1
Asthma	1	Varicocele	1
Fractures	1	General debility	1
Pneumonia	1	Acute bronchitis	1
Cellulitis	1	No diagnosis	34
Chronic dyspepsia	1		

These 131 cases of estivo-autumnal fever may be divided, as regards their etiology, as follows:

Tertian estivo-autumnal infections	102
Quotidian estivo-autumnal infections	29

The tertian estivo-autumnal cases were divided as follows:

Chronic dysentery	35	Dipsomania	1
Chronic diarrhea	12	Rheumatism	1
Pulmonary tuberculosis	3	Fracture	1
Wounds	3	Chronic nephritis	1
Acute melancholia	2	Furuncle	1
Chronic gastritis	2	Cellulitis	1
General debility	1	Acute bronchitis	1
Insanity	1	Pneumonia	1
Syphilis	1	Paralysis	1
Otitis-media	1	Chronic dyspepsia	1
Appendicitis	1	No diagnosis	30

The quotidian estivo-autumnal infections were diagnosed as follows:

Chronic dysentery	8	Furuncle	1
Pulmonary tuberculosis	5	Otitis-media	1
Chronic diarrhea	3	Uræmia	1
Chronic gastritis	1	Syphilis	1
Asthma	1	Tachycardia	1
Acute pharyngitis	1	No diagnosis	5

The quartan infections.—There was one case which showed the presence in the blood of the quartan parasite. This case was diagnosed as chronic dysentery.

Combined infections.—There were four cases of combined tertian and estivo-autumnal malaria, all of which were diagnosed as chronic dysentery.

From the consideration of these cases in which the malarial parasites were found in the blood, but in which it was impossible to diagnose the infection, it will be seen that the diagnosis of chronic dysentery was altogether the most common. This was probably due largely to the fact that many of these cases were suffering from chronic dysentery and malaria as a complication, but it should not be forgotten that many cases of pure malaria present symptoms which are referable to the intestinal tract, such as diarrhea, indigestion, etc., and the fact that many of these cases recovered under quinine, even from the intestinal complication, conclusively proves that this is the case. In my opinion every case of diarrhea or dysentery should have a blood examination for the parasites of malarial fever.

The diagnosis of pulmonary tuberculosis in these cases was in every instance due

to the emaciated condition of the patient and the rise in temperature which resembled that of the disease in question. It will be seen that of the thirteen cases so diagnosed eight were due to the tertian estivo-autumnal parasite and five to the quotidian parasite. The administration of quinine in these cases resulted in complete recovery. Here again the importance of the examination of the blood in cases of suspected pulmonary tuberculosis is manifest.

The most important lesson taught from this large number of cases in which malaria was not suspected is the importance of examining the blood of every case of disease arising in the Tropics and how little faith can be placed in the clinical symptoms which may be present. While many of these cases were complicated by the disease which was diagnosed, it was invariably found that the termination of the malarial infection by treatment with quinine resulted in a general improvement of the condition present.

An interesting fact shown by the examination of blood at this hospital has been the occurrence together of the parasites of malarial fever and the amœbæ of dysentery. Of the cases which were diagnosed as chronic dysentery and proved to be infected with the malarial parasites, 10 per cent showed the amœbæ of dysentery in the fæces.

Reference to the table will show that a great majority of the cases of latent and masked malarial fever were infected by the estivo-autumnal parasite. This fact is of the greatest importance, as it demonstrates how this fatal type of malarial parasite may be present without producing any definite clinical symptoms. In such cases it is very important to recognize the presence of this organism in soldiers campaigning in the Tropics under many climatic and sanitary conditions which deplete the strength and render the individual more susceptible to disease. The presence of this parasite in the blood should always be considered as a serious matter, for it may at any time begin to multiply rapidly and give rise to pernicious symptoms. The microscopical examination of the blood enables us to recognize its presence ofttimes when it is not suspected, and this enables us to apply the proper treatment with the greatest chance of success and with the least discomfort to the patient.

Widal test.—There were comparatively few Widal tests made during the year, as there has been no epidemic of typhoid fever in the camps here, nor do we receive many cases from the Philippines. There were 118 tests made in all, of which only 9 proved positive. Of these 9 positive cases, 4 were patients returning from the Philippine Islands, and the remaining 5 were patients received from the recruit camp.

Estimation as to number of red blood corpuscles.—There have been 168 blood counts made during the year in cases suffering from anæmia. Many of these counts have shown a very great reduction in the number of red cells, a large number being below 1,000,000 red cells per cubic millimeter, and one case showed only 420,000 red cells to the cubic millimeter before death. Most of these low blood counts were in cases suffering from anæmia secondary to other diseases, such as dysentery, malaria, and typhoid fever. Only three cases of typical pernicious anæmia occurred during the year.

(B) EXAMINATIONS OF URINE.

During the year 5,935 specimens of urine were examined chemically and microscopically. It has been the rule to examine the sediment of every urine microscopically, whether or no albumen was present. This has been rendered possible by the installation in the laboratory of an electric centrifuge. The results obtained by the examination of the urine are as follows:

	Cases.
Albumen was found in	845
Pus in	431
Blood in	68
Casts in	338
Sugar in	34
Spermatozoa in	23

Examination of urine for effect of anæsthetics.—During the year a careful record has been kept of the results of the examination of the urine of cases operated upon at this hospital under anæsthesia. The method of obtaining these results is as follows: An examination of the urine is made just before the operation. Immediately after the operation the urine is drawn by a catheter and examined. In those cases in which the urine showed an abnormal condition it was examined every twenty-four hours until it became normal.

One hundred and fifty-six specimens of urine were thus examined for the effect of anæsthetics, with the following results:

	Cases.
Albumen was found in	14
Hyaline casts in	3
Granular casts in	5
Granular and hyaline casts in	3
Granular and epithelial casts in	3
Hyaline and epithelial casts in	1
Normal	127

In all the cases the urine showed a marked increase in specific gravity.

The anæsthetic used has been almost invariably chloroform, although ether has been used in a few cases. Those cases in which ether was used showed no abnormal condition of the urine after operation, beyond an increase in specific gravity.

The urine of all cases which showed albumen or casts became normal in a few days, thus showing that the effect of the anæsthetic was transitory.

From the above results it will be seen that in ordinary surgical work the effect upon the kidneys of chloroform is not of great importance. While chloroform undoubtedly may cause an acute congestion of the kidney, this congestion is only temporary and speedily passes away without leaving, so far as can be seen, any permanent disability. A large number of chemical examinations were made in these urines to determine the relative amounts of chlorides, sulphates, phosphates, and urea present after the administration of the anæsthetic. The results obtained have been so contradictory, however, that they are of no scientific value, although the excretion of urea was found to be almost invariably increased.

Examinations of urine for the bacillus of tuberculosis.—There have been eight specimens of urine examined for the bacillus of tuberculosis, only one of which proved positive. In this specimen the bacilli were very numerous and the autopsy showed a marked tuberculosis of the testicle, prostate, and neck of the bladder.

(c) EXAMINATIONS OF SPUTA.

During the year 1,082 specimens of sputa were stained and examined for the bacillus of tuberculosis, with a positive result in 169 cases. It has been found that in many instances the sputa of patients returning from the Philippines contains so very few bacilli that repeated examinations are necessary before they can be demonstrated. Accordingly, an order was issued requiring at least six sputa examinations in cases of suspected tuberculosis before a case could be considered negative. This order has resulted in the demonstration of the bacilli in quite a number of cases in which from two to four examinations had been negative. It has also caused a very large negative result in the total number of sputa examinations.

(d) EXAMINATIONS OF FÆCES.

During the year 1,116 specimens of fæces were examined for the amœba of dysentery with a positive result in 223 cases. In my report of last year I stated that of 313 examinations of fæces only 8 showed the presence of the amœba. It will be seen that this year the number of cases showing the amœba is very much larger and is probably explained by the large number of United States volunteers who were returned during the year to be mustered out, who would otherwise have remained on duty in the Philippine Islands, even though suffering from attacks of amœbic dysentery. It is a well-known fact that cases suffering from this disease often recover sufficiently to return to duty, even though this recovery is, as a rule, followed by a relapse.

The large percentage of amœbic dysentery found in the Philippines, and which did not agree with the results obtained at this hospital, is undoubtedly very largely explained by the fact that the greater number of cases of amœbic dysentery were not returned to the United States immediately, but only after two or more attacks. This was especially true in the case of volunteers, many of whom, although suffering from relapses of this disease, were able in the intervals to do duty. When, therefore, these men were returned to be mustered out according to law, the percentage of amœbic dysentery found at this hospital was greatly increased.

Another feature which undoubtedly appears in lowering the percentage in which amœbæ are present in the fæces, as compared with the results obtained in the Philippines, is that during the passage across the Pacific many of the cases recovered apparently under a change of climate and medical treatment, and when they reached this hospital were having the normal number of bowel movements, with no evidence of dysentery. Such cases were examined, and if thought able to do duty were imme-

diately transferred to the camps at the Presidio, and were never entered at this hospital as patients.

There have been a few fatal cases diagnosed as amœbic dysentery observed at this hospital in which the amœbæ were present in the fæces, but which upon autopsy were found to present no evidence of the disease. These cases will be referred to more fully in another section of this report.

Cercomonas intestinalis was present in the fæces of 30 cases diagnosed as chronic dysentery. They were almost invariably accompanied by the amœbæ. In only one case were tænia segments observed. In no case was the anchylostoma duodenalis found.

(E) EXAMINATIONS OF POST-MORTEM MATERIAL.

There were 162 autopsies performed at this hospital during the year, and in all these cases sections of the viscera were prepared and stained. In all, 798 sections have been prepared. The following is the cause of death in the cases autopsied:

	Cases.
Chronic dysentery (follicular 18, diphtheritic 30, gangrenous 2, amœbic 23)	73
Pulmonary tuberculosis	22
Lobar pneumonia	19
Chronic enteritis	7
Broncho-pneumonia	6
General miliary tuberculosis	5
Acute septicæmia	4
Empyema	4
Acute nephritis	4
Pernicious anæmia	3
Acute peritonitis	2
Acute meningitis	2
Chronic nephritis	2
Enteric fever	2
Valvular disease of the heart	2
Chronic colitis	2
Carcinoma of larynx	1
Pernicious malarial fever	1
Cerebral apoplexy	1

In order to obtain a comprehensive view of the complications which have accompanied the disease causing the greatest number of deaths at this hospital, I have prepared the following table, showing the cause of death and the complications observed:

Cause of death.	Number of cases.	Complications.
Chronic dysentery:		
Follicular	18	Acute nephritis, 7 cases; chronic enteritis, 11; chronic gastritis, 6; fatty degeneration of the liver, 6; chronic pleurisy, 5; chronic nephritis, 3; venous congestion of liver, 3; lobar pneumonia, 3; arteriosclerosis, 3; acute pericarditis, 2; chronic bronchitis, 2; subacute parenchymatous nephritis, 3; lobar pneumonia, 3; infarcts of lung, 2; cirrhosis of spleen, 2; cirrhosis of liver, 1; infarcts of spleen, 1; pulmonary tuberculosis, 1.
Diphtheritic	30	Chronic enteritis, 24; chronic gastritis, 20; cirrhosis of spleen, 18; subacute parenchymatous nephritis, 15; acute tubular nephritis, 11; fatty degeneration of liver, 10; venous congestion of liver, 10; chronic pleurisy, 10; hypostatic pneumonia, 10; melanosis of spleen, 4; chronic bronchitis, 3; cirrhosis of liver, 3; metastatic abscess of liver, 2; acute pericarditis, 2; lobar pneumonia, 1; acute peritonitis, 1; acute pleurisy, 1; fibroid pneumonia, 1; pulmonary tuberculosis, 1.
Gangrenous	2	Chronic enteritis, 2; chronic gastritis 2; fatty degeneration of liver, 2; acute peritonitis, 1; acute nephritis 1; subacute nephritis, 1; broncho-pneumonia, 1; arterio sclerosis, 1.
Amœbic	23	Chronic enteritis, 17; chronic gastritis, 10; acute nephritis, 13; abscess of liver, 9; cirrhosis of spleen, 9; venous congestion of liver, 8; fatty degeneration of liver, 7; subacute parenchymatous nephritis, 7; acute peritonitis, 5 (3 due to liver abscess opening into abdomen); chronic nephritis, 2; hypertrophy of heart, 2; pulmonary tuberculosis, 2; abscess of kidney, 2; empyema, 2 (both due to rupture of liver abscess into the pleural cavity); acute pericarditis, 1 (due to perforation of amœbic abscess into the pericardial cavity); acute bronchitis, 1; chronic pleurisy, 1; arterio sclerosis, 1.

Cause of death.	Number of cases.	Complications.
Chronic enteritis	7	Fatty degeneration of liver, 6; acute nephritis, 5; chronic pleurisy, 3; chronic gastritis, 5; cirrhosis of spleen, 3; venous congestion of liver, 3; subacute parenchymatous nephritis, 2; colitis, 2; chronic nephritis, 1; venous congestion of spleen, 1; fatty degeneration of heart, 1; acute bronchitis, 1; bronchopneumonia, 1; arterio sclerosis, 1.
Pulmonary tuberculosis	22	Acute nephritis, 14; tuberculosis of intestine, 12; fatty degeneration of liver, 10; chronic pleurisy, 8; venous congestion of liver, 8; chronic enteritis, 5; empyema, 5; cirrhosis of liver, 4; cirrhosis of spleen, 4; acute pericarditis, 3; chronic gastritis, 3; tuberculosis of kidneys, 2; tuberculosis of spleen, 2; chronic dysentery, 2; chronic pericarditis, 2; acute pleurisy, 2; tuberculosis of liver, 2; amœbic dysentery, 1; chronic nephritis, 1; tubercular meningitis, 1; chronic colitis, 1; ascites, 1; acute appendicitis, 1.
Lobar pneumonia	19	Acute nephritis, 15; acute pleurisy, 15; fatty degeneration of liver, 14; venous congestion of liver, 10; acute pericarditis, 9; hypertrophy of heart, 16; acute splenitis 8; chronic enteritis, 6; acute gastritis, 4; chronic gastritis, 2; subacute parenchymatous nephritis, 2; acute meningitis, 1; chronic pleurisy, 1; arterio sclerosis, 1,
Broncho-pneumonia	6	Acute nephritis, 6; acute pleurisy, 5; hypertrophy of heart, 4; venous congestion of liver, 4; acute pericarditis, 2; chronic enteritis, 1; chronic gastritis, 1.
Pernicious anæmia	3	Subacute parenchymatous nephritis, 3; venous congestion of liver, 3; fatty degeneration of liver, 3; dilatation of right heart, 3; acute pleurisy, 2; œdema of pericardium, 2; hypertrophy of spleen, 1; bronchopneumonia, 1.

From the foregoing table it will be seen how numerous are the complications which attend some of the diseases which produce the greatest fatality in soldiers returning from the Philippine Islands. Because of their importance I wish to consider, somewhat at length, the complications attending dysentery.

Complications observed at autopsy in cases of dysentery.—In the study of post-mortem material presented in autopsies upon patients dying at this hospital from dysentery, I have paid especial attention to the pathological conditions present in the various organs. These have been so constant, and in many instances so important, that it seems to me that they should be considered more at length than they are in most of the text-books upon medicine. In looking up the subject of the complications attending dysentery in recent works, I have been surprised at the scant attention which they have received. For instance, in Davidson's article upon dysentery in Volume II of Allbut's System of Medicine no mention whatever is made of the complications attending the disease. In Lafleur's article upon amœbic dysentery in the same volume, the complications attending it are dismissed in a very few lines, the only ones which received much attention being abscess of the liver and intestinal perforation. This lack of detailed description of the complications in dysentery is the more surprising, as in the cases which have died at this hospital the complications have been very severe, and in many instances have been the cause of death. While it is possible that many of the complications may have been due to campaigning in tropical countries, with the incident hardships and lack of hygienic living, yet many of them are so constant that it is impossible not to believe that they are due to the disease itself.

In considering the subject I shall first consider the complications as a whole, without relation to their occurrence in the various forms of dysentery observed here, and afterwards consider the complications as relative to the different varieties of the disease. In the 73 cases of fatal dysentery which have been autopsied the complications present may be divided as follows:

Complications observed in the nervous system.—The brain in nearly every case in which it was examined (35) showed an increase in the amount of cerebro-spinal fluid. Often this increase was very excessive, the brain being œdematous. Upon dissection of the brain the lateral ventricles were invariably found filled with fluid and the choroid plexus was invariably congested. In all the cases of amœbic dysentery the blood vessels of the cerebrum were very much congested and in about one-half of the cases small capillary hemorrhages had occurred. In all the cases of follicular dysentery the cut surface of the cerebrum was anæmic in appearance, while in the diphtheritic and gangrenous forms the cut surface was as a rule congested. In 3 cases of amœbic dysentery and in 2 of the gangrenous form small areas of softening were presented in the frontal lobes near the median fissure.

Complications observed in the respiratory system.—The most common conditions found complicating dysentery, in the lungs, were emphysema and bronchopneumonia.

Of the 73 cases, 42 showed an emphysematous condition of the lungs, while 21 showed a condition of bronchopneumonia. Perhaps a better name to designate this pneumonia is hypostatic, as it is probably due to maintaining a recumbent position for so long a time, but as the pathological conditions are identical with those found in bronchopneumonia I have preferred to retain that name. Another very common condition found is chronic pleurisy, which was found in 16 cases. This condition was evidently, in all these cases, of long standing. Lobar pneumonia occurred in 4 cases and was the cause of death in all. Chronic bronchitis occurred in 5 cases, acute bronchitis in 1 case, acute pleurisy in 1 case, infarcts of lung in 2 cases, and pulmonary tuberculosis in 3 cases. Empyema was found in 2 cases, both due to a rupture of liver abscess into the pleural cavity. Metastatic abscesses of the lung were found in both cases of gangrenous dysentery, and in both cases was associated with abscess of the spleen and kidney. The two most frequent complications in the respiratory system were emphysema and bronchopneumonia and these are also the two which would be most likely to occur, owing to the weakness and recumbent posture of the patient. In every case a good deal of congestion of the lower lobes of the lungs was observed, but I have only considered the condition as one of bronchopneumonia when the characteristic pathological lesions were present upon microscopical examination.

Complications observed in the circulatory system.—In 51 of the cases the amount of fluid in the pericardial cavity was markedly increased. This œdema of the pericardium is one of the most characteristic complications observed in the fatal cases of dysentery. The fluid was in most instances clear, of a light yellowish color, but in a few cases small shreds of fibrin were present.

Acute pericarditis.—This complication was observed in 5 cases, and in every case the effusion was purulent. In 1 case the pericarditis was due to perforation of an amœbic abscess of the liver into the pericardial cavity.

The heart.—In none of the cases were any of the complications present due to a disease of the heart. Arteriosclerosis was presented in only 2 cases—1 of the gangrenous dysentery and the other amœbic dysentery.

Complications observed in the genito-urinary system—Kidneys.—Some form of inflammation of the kidney was presented in almost every case of dysentery which came to autopsy. Thus, out of 73 cases 63 showed some form of nephritis. Of the varieties of the inflammation of the kidney, acute tubular nephritis was the most common, 32 of the 63 cases being caused by this variety. Next in frequency comes the subacute parenchymatous form, which furnishes 26 of the cases. The remaining 5 were due to chronic interstitial nephritis.

In every case of dysentery which has come to autopsy at this hospital there has been more or less congestion of the kidneys, but microscopical appearances of nephritis were present in 63 of the cases. This very large percentage of kidney disease accompanying chronic dysentery would seem to indicate that the kidneys are especially susceptible to the poisons which are elaborated during the process of the dysenteric infection. There was nothing peculiar noticed about the microscopical appearance of the sections from the kidneys in nephritis complicating dysentery beyond the fact that in the gangrenous cases there were present minute abscesses due to the lodgment of some bacterial emboli in the organs.

In those cases which presented a chronic interstitial form of nephritis there was a history of alcoholism which probably accounted for the character of the complication.

Complications observed in the glandular system—The liver—fatty degeneration.—The most common complication found in the liver was fatty degeneration, which was present in 35 of the cases. Upon microscopical examination the fatty degeneration was found to be very extensive, in most instances large areas being apparently composed of fat, all trace of the liver tissue having been lost.

Venous congestion.—The next most common complication observed in the liver was chronic venous congestion, present in 21 cases. Microscopically this condition was often shown to be very marked, the capillaries being gorged with blood, and in many cases having ruptured into one another and destroyed the liver tissue in the vicinity.

Cirrhosis.—Cirrhosis of the liver was observed in four cases. In all, the condition was one of common interlobular cirrhosis of slight extension. In a large number of cases, however, a condition was presented which was evidently the commencing stage of cirrhosis, in that while the increase in the interlobular connective tissue was somewhat increased in amount, the condition was not well enough established to class it as a distinct cirrhosis. In most cases this increase in the connective tissue was undoubtedly due to a recent profuse hepatitis.

Metastatic abscesses.—In 2 cases of dysentery metastatic abscesses were found. This condition is somewhat rare in the liver, but it is common in the lungs, as a rule, although in the cases observed this year metastatic abscesses occurred with the same frequency in both situations.

Amœbic abscesses.—Amœbic abscesses of the liver occurred in 9 of the fatal cases of dysentery, and in all cases in which it occurred the classical pathological findings of amœbic dysentery were present.

These liver abscesses varied in size from small ones, measuring about 2 centimeters in diameter to those measuring 12 centimeters in diameter, and in number from 1 to 10. They contained, as a rule, greenish pus, with blood and a chocolate-colored substance. Their walls were very ragged in appearance, however, there being very seldom any well-marked fibrous layer bounding the abscess. In 3 cases abscesses of the liver had perforated into the pleural cavity, causing empyema, and in 1 case the abscess perforated into the pericardial cavity, causing acute pericarditis. Thus it will be seen that of the 9 cases of amœbic abscess of the liver 6 had perforated and given rise to complications which caused death.

The spleen—Cirrhosis.—Altogether the most common complication observed in the spleen was cirrhosis of the organ, due to the increased growth of the connective tissue of the capsule, trabeculæ and the Malpighian corpuscles. This condition was present in 29 cases, being the most common in the diphtheritic variety of the disease. In the cases of gangrenous and amœbic dysentery there was generally present an acute inflammation of the spleen, as shown by its congestion, tense capsule, and diffluent consistence.

Infarcts.—Two cases of dysentery showed infarcts of the spleen.

Melanosis.—Melanosis of the spleen, due to previous or concurrent malarial infection, was present in 4 cases.

Complications observed in the digestive system—Chronic enteritis.—As would be expected, chronic enteritis almost invariably accompanied the dysenteric process. Of the 73 cases, 54 showed a marked chronic enteritis, while 10 of the 19 remaining showed some inflammation of the small intestines, but not marked enough to class as a distinct enteritis. In all the cases which I have considered as enteritis the inflammatory condition present extended as far as the stomach.

Chronic gastritis.—Next in frequency to chronic enteritis, as a complication, comes chronic gastritis, which was present in 38 of the cases. In nearly every case the gastritis was of considerable severity.

Perforation of the intestine.—In 4 cases perforation due to dysenteric ulcerations of the intestine was present. In all these cases the perforation occurred in the rectum.

Acute peritonitis.—In 7 cases acute peritonitis was found at autopsy, due in 3 cases to perforation of a liver abscess into the abdominal cavity, and in the remaining cases to perforation of the intestine by dysenteric ulcers.

Complications in relation to the type of dysentery.—As regards the frequency of the occurrence of the various complications in the various types of dysentery, I shall consider only those which are of the most importance. Abscess of the liver occurred only in the amœbic and diphtheritic forms. Of 23 cases of amœbic dysentery, 9 showed liver abscesses. Of the 30 cases of diphtheritic dysentery, 2 showed the presence of metastatic abscess in the liver.

Nephritis.—Acute nephritis was present most often in the amœbic form of the dysentery, 13 out of 23 cases showing it. Next in frequency comes the diphteritic variety, which presents 11 cases out of 30. The follicular form of dysentery showed the fewest cases of nephritis, only 7 out of 18 being observed. If we consider the cases of gangrenous dysentery, it is seen that 1 case of 2 presented an acute form of nephritis, giving a percentage of 50, but the number of cases observed is not sufficient for us to base any conclusions upon.

Subacute parenchymatous nephritis was the most common in the diphtheritic form of the dysentery, 15 out of 30 cases presenting it. Next in frequency comes the amœbic form, in which 7 out of 23 cases showed it, while the follicular form showed 3 out of 18 cases. The gangrenous form showed 1 out of 2 cases. Chronic nephritis was the most common in the follicular form of dysentery, 3 out of 18 cases showing it.

Fatty degeneration of the liver.—This complication was the most common in the follicular and diphtheritic forms of dysentery, the follicular form showing 6 out of 18 cases, and the diptheritic form 10 out of 30 cases. The amœbic form showed 7 out of 23 cases.

Venous congestion of the liver.—This complication was most common in the diphtheritic form of dysentery, 10 cases out of 30 presenting it. The amœbic form presented the condition in 8 cases out of 23, and the follicular form in 3 cases out of 18.

Cirrhosis of the spleen.—This complication was most frequent in the diphtheritic form of dysentery, 18 out of 30 cases showing it. The next in frequency is the amœbic dysentery, with 9 cases out of 23, while only 2 instances of it occurred in the 18 follicular cases.

Acute peritonitis.—Acute peritonitis was most common in the amœbic form of dysentery, 5 out of 23 cases presenting this complication. In 3 cases it was due to

rupture of liver abscess, and in 2 to the perforation of the intestines. The gangrenous form of dysentery showed 1 case of acute peritonitis, due to perforation of the intestines, which was also true of the diphtheritic form.

From the above summary of the complications of the various forms of dysentery it will be observed that the most serious complications are most frequent in the severer forms of the dysenteric process; as, for instance, in the diphtheritic, gangrenous, and amœbic types, while they are the least common in the follicular form, which is also the least severe from a pathological standpoint.

From the study of the complications which attend dysentery it will be seen how numerous and important they are. It is not too much to say that in a large proportion of the cases which resulted fatally death was due more to the complications than to the dysenteric affection.

The various forms of dysentery.—During the past year, from the study of the cases on the post-mortem table, I have seen no reason for changing my conceptions of the various forms of dysentery, considered from the standpoint of a pathologist. Considered in this way I make the following distinctions as to classification: Chronic dysentery nonamœbic and chronic dysentery amœbic. In the nonamœbic there may be recognized three stages of the disease, i. e., follicular, pseudodiphtheritic, and gangrenous. These three stages, however, belong to one process, the disease beginning as the follicular affection and gradually assuming the process found in the pseudodiphtheritic and gangrenous form. In other words, the three divisions named are simply stages of one process, the gangrenous being the result of the follicular and pseudodiphtheritic. I believe that a certain portion of this nonamœbic dysentery is the chronic form of specific dysentery observed in the Philippines. This I believe because I have been able, in a few instances, to separate the bacillus of Shiga from the intestine in cases of the follicular and pseudodiphtheritic forms of dysentery which have died at this hospital.

Under the amœbic form I include all cases of dysentery in which the amœbæ are present in the fæces and which present at autopsy the characteristic pathological picture which is found in dysentery due to the amœbæ.

The pathological appearance present in the intestine in amœbic dysentery differs very remarkably from that present in the other forms, and one has no difficulty whatever in diagnosing the amœbic from the other varieties of dysentery from the character of the ulcers alone. I shall not consider here the pathology of dysentery, as I have already covered the subject in a previous report and see no reason for changing any of my views regarding it.

Many of the cases which died of dysentery at this hospital gave a history of previous malarial infection, but only a small number showed any trace of such infection at autopsy. There have been a large number of cases of malaria treated at this hospital, but only one case that resulted fatally. The patient suffered from the quotidian estivo-autumnal infection and despite all treatment gradually passed into a comatose condition, which resulted in death. The autopsy findings in this case were so typical of the condition present in pernicious estivo-autumnal fever that I shall insert here the anatomical and microscopical reports.

A CASE OF PERNICIOUS QUOTIDIAN ESTIVO-AUTUMNAL FEVER, ILLUSTRATING ANATOMICAL AND MICROSCOPICAL CHANGES IN FATAL CASES.

R. G. C., teamster. Died, 4.30 a. m. July 21, 1900. Age, 52 years. Clinical diagnosis: Pernicious quotidian estivo-autumnal fever.

Body that of a man apparently 52 years of age, somewhat emaciated. Skin yellowish. Rigor mortis slight. Post-mortem discoloration over dependent portions of the body. Finger nails not congested. Pupils irregularly dilated.

Brain.—Dura mater appears normal. The amount of cerebro-spinal fluid is increased. The surface of the cerebrum is pale, and upon section the medullary portion appears hyperæmic, and the cortex is slate colored. The lateral ventricles are filled with fluid. The choroid plexus is not congested. Upon section the cut surface of the cerebellum appears normal, save for congestion and slight pigmentation. Externally the blood vessels of the cerebrum are congested.

Thoracic and abdominal cavities.—The subcutaneous fat and muscular tissues are normal in amount. The pleural cavities are free from fluid. The liver reaches about 1 centimeter below the border of the last rib. The greater omentum contains a large amount of fat and reaches to a level with the umbilicus. The appendix is about 3 centimeters in length and lies in the right iliac fossa. It is normal in appearance. The bladder is dilated. The abdominal aorta shows no evidence of sclerosis. The suprarenal glands appear normal.

Liver.—The liver measures 28 by 21 centimeters. It is dark in color externally.

The gall bladder contains a large number of gall stones, and some inspissated bile. Upon section the cut surface of the organ is slate colored, and the lobules are ill defined. The organ is congested. Weight, 1,640 grams.

Spleen.—The spleen measures 19 by 12 centimeters. The organ is purplish black in color externally. The capsule is smooth. Upon section the cut surface appears almost black in color, with light areas scattered throughout it. The consistence of the organ is very much diminished, it being almost diffluent. Weight, 440 grams.

Pancreas.—The pancreas measures 22 by 4½ centimeters. Upon section the cut surface appears congested. Weight, 115 grams.

Left kidney.—The organ is pale in color. The capsule is smooth and slightly adherent. Upon section the cut surface is congested. The cortex and pyramids are distinct, and the cortex is normal in thickness. Weight, 125 grams.

Right kidney.—The organ is somewhat lobulated. The capsule is slightly adherent; otherwise it resembles the left. Weight, 125 grams.

Lungs.—The lungs are crepitant throughout and appear normal. The pericardial cavity contains about 30 cubic centimeters of clear straw-colored fluid.

Heart.—The amount of extracardial fat is increased. The vessels are congested. Upon section the ventricles contain small clots. The muscular walls are about normal in thickness. The valves of the heart are normal, with the exception of the middle segment of the pulmonary valve, which contains numerous small apertures.

Intestines.—The mucous membrane is congested; otherwise they are normal.

MICROSCOPICAL EXAMINATION.

Liver.—Sections of the liver show the pathological lesions of cloudy swelling and the changes found in pernicious malarial fever. The fibrous tissue in the portal spaces has slightly increased in amount, and there are large numbers of connective tissue cells present. All the blood vessels in the organ are increased in thickness. The liver cells are swollen, smoky, and granular in appearance, and in many of them the nucleus is present and shows necrotic changes, as evidenced by the pale stain and the granules of the chromatin, which are widely separated or are collected in small clumps. The protoplasm of the liver cells contains much fine yellowish pigment, which seems to be distributed only in the protoplasm, and not in the nucleus. The intralobular capillaries contain a great deal of black pigment, numerous large macrophages, and smaller mononuclear leucocytes. The pigment, which is free in the capillaries, is in the form of irregular blocks, and none of the yellow pigment which is present in the liver cells is seen in the capillaries. The large macrophages which crowd the capillaries contain within their protoplasm an immense amount of black pigment, evidently derived from broken-down malarial parasites They also contain blood corpuscles containing parasites and free parasites of the estivo-autumnal variety. The number of parasites present is comparatively small, but the amount of pigment present is immense, and in clumps so large that many of the capillaries are occluded by it. This is especially noticeable in the capillaries near the portal spaces. On account of the small caliber of the interlobular capillaries the large macrophages are compressed and they appear often as large, slender, pigment-bearing cells. Some of these leucocytes are so large as to entirely block the capillaries. The malarial parasites present are small, round, or oval bodies, generally collected at the center. These are presegmenting parasites. No crescent forms were observed in the liver. The stellate cells of Kupfer contain black pigment and sometimes small parasites. In numerous places throughout the capillaries of the liver there are large bleb-like parasites containing pigment, which are evidently degenerating. The pigment in the macrophages is in the form of small, round blocks or larger irregular collections, and is dark brown or almost black in color. There is not a single capillary in the sections that does not show pigment-bearing cells.

Spleen.—Sections of the spleen show the changes characteristic of pernicious malarial fever. The Malpighian bodies are somewhat fibrous, and at their border there is an immense amount of yellowish-black pigment. The splenic pulp contains a small number of red corpuscles, which contain small round or oval estivo-autumnal parasites, which are pigmented. There is not the usual number of red corpuscles present in this spleen that we generally find in the spleens from cases of pernicious malaria. The splenic pulp also contains immense numbers of macrophages and large masses of free pigment. The macrophages are large white cells, which contain the following objects: (1) Large irregular collections of brownish-black pigment; (2) red corpuscles containing small round, pigmented estivo-autumnal parasites; (3) free estivo-autumnal parasites, most of them pigmented or showing signs of segmenting; (4) fine granules of yellowish pigment, which is entirely distinct from the black pigment present.

Some of the macrophages show all of these within their protoplasm, while others, and they are in the majority, show only one or two free parasites and irregular collections of pigment. As a rule these white cells are about six times the size of a blood corpuscle, but some of them are present which are very much larger. These very large cells entirely block the capillaries of the organ, thus hindering the circulation.

Besides the macrophages there are numerous mononuclear leucocytes and endothelial cells which do not take up the pigment of the parasites. The polymorphonuclear leucocytes are comparatively few in number. Everywhere throughout the sections there are very large masses of pigment situated in the spaces of the splenic pulp, often so large as to rupture them and cause an area of necrosis in which they are situated.

Throughout the spleen may be seen the crescentic forms of the quotidian estivo-autumnal parasite, but they are comparatively few in number. These crescents appear exactly as they do in the peripheral blood. In the spleen there are also numerous large bleb-like parasites like those seen in the liver, which contain much pigment and numerous vacuoles. These are evidently degenerating bodies. The segmenting forms of the parasite are remarkably few in number in the sections of the spleen, but many of the macrophages contain segmenting bodies.

Kidney.—Sections of the kidney show the pathological lesions of acute nephritis and the changes present in pernicious malaria. The Malpighian bodies are greatly congested, the capillaries being filled with blood and some of them have ruptured, thus causing hemorrhages within the tufts. Many of the capillaries contain small, free, round, or oval parasites, containing a small clump of pigment at their center. The capillaries also contain a few red cells which are infected by the parasites. There is present a small amount of free pigment. In the capillaries may be seen, now and then, a large bleb-like body, evidently a degenerated parasite, like those seen in the liver and spleen. The number of infected corpuscles and free parasites and the amount of pigment is very much smaller than in the case of the liver and spleen. No crescent forms were observed in the Malpighian bodies. The epithelium of the tubules is much swollen and is rapidly proliferating, while the protoplasm of the cells is smoky and finely granular in appearance, and contains, in many instances, pigment grains of a yellowish color.

One of the most interesting features of the kidney sections is the occurrence within many of the tubules of collections of black pigment and here and there a few parasites. There are few parasite-infected red blood corpuscles present in the tubules. The capillaries between the tubules contain numerous free parasites, round or oval in shape, and pigmented; also macrophages and infected red corpuscles. The macrophages, as in the liver and spleen, contain free pigment and parasites, and red corpuscles containing parasites or yellowish pigment. The walls of the capillaries are not thickened. It is especially noticeable how slight the amount of pigment is in the kidneys, as compared with the liver and spleen, and how few parasites are present.

Brain.—Sections of the brain show the pathological lesions of pernicious estivo-autumnal fever of comatose type. The changes observed in the sections of the brain may be divided into those occurring in the capillaries and those within the brain substance proper. The small capillaries of the brain, especially those of the cortex, are crowded with pigmented free parasites, leucocytes containing pigment, and in some places by small collections of yellow pigment. The infected capillaries are most numerous in the cortical portion of the brain, but they are by no means rare in the medullary portion. The pigment in the capillaries is generally collected in irregular masses, is brownish in color, and in some places entirely occludes the lumen of the capillary. This condition, which is very noticeable throughout the sections, no doubt accounts for the symptoms present referable to the brain. The parasites present in the capillaries are mostly free; are oval or circular in shape, small, and contain pigment which is generally collected near the center in the form of small grains or collections of grains. It is remarkable how uniform these parasites are in appearance, and how rarely is seen a red cell infected by parasites. It may be that during the preparation of the specimen the red cells become disintegrated, but this is hardly probable. In some places the capillaries are occluded by large white cells (macrophages), containing much pigment and numerous free parasites. Taken as a whole the pigment present in the brain is not large.

The changes occurring within the substance of the brain consist in a necrosis of the protoplasm of some of the cells, as is evidenced by the irregular staining of the protoplasm and nuclei.

Intestines.—Sections were not made of the stomach and intestines, as they presented no evidence of malarial infection.

During the year there have been three fatal cases at this hospital in which, before

death, numerous amœbæ, indistinguishable from those found in dysentery, were present in the fæces, but in which at autopsy none of the pathological appearances typical of dysentery were present. Fæces in these cases did not differ markedly from those common to amœbic dysentery, save that no blood was present in them. The amœbæ present occurred in great numbers and were perfectly typical of the amœbæ of dysentery. These cases conclusively prove that the amœbæ can be present in the intestine without producing any disease, as in all these cases the large intestine appeared normal, the only condition present being chronic enteritis and gastritis. While it can not be denied that in cases of amœbic dysentery the amœbæ produce typical lesions in the large intestine, it is a question in my mind whether they are the primary cause of the disease. From the conditions found in the cases just mentioned I would be inclined to regard the amœbæ as a secondary feature in the production of dysentery. Of course it may be possible that the individuals in which these amœbæ were found were peculiarly resistent to their action, or that some peculiar condition was present in the large intestine which prevented the amœbæ from obtaining a foothold. But even if we allow this argument it is one in favor of the amœbæ being a secondary feature, as, unless such conditions were present, it would remain harmless. I am satisfied, from my examinations of fæces and the clinical symptoms, that the amœbæ are often present in the intestine without producing dysentery.

Regarding the preparation of microscopical sections from the cases which were autopsied, I would say that I have found it to be a most valuable routine procedure, as by so doing many changes were found to be present in the viscera which were not visible to the naked eye, and thus a more accurate and scientific diagnosis of the fatal cases arrived at. I have felt that, although it entails in the laboratory an immense amount of work, the results gained have more than paid for the trouble taken.

(F) MISCELLANEOUS EXAMINATIONS.

There have been 345 examinations which I have classed as miscellaneous. These have included special researches, examinations of cultures and smears from cases of suspected diphtheria, water and milk analyses, and examinations of urine and sputa for the officer in charge of the mustering out of United States Volunteers.

During the year, by direction of the commanding officer, I have sectioned the appendix in every case which has been operated upon by him, and a record has been kept of the pathological findings. Photomicrographs have been taken of a large number of sections, but, on account of inadequate apparatus for fine work in this direction, they have not been as satisfactory as could be desired. Cases of appendicitis operated upon, and of which sections were made, may be divided as follows, from a clinical standpoint: Acute appendicitis; recurrent appendicitis.

Every case operated upon at this hospital has shown some pathological change in the appendix, and from the standpoint of a pathologist they may be divided as follows: Catarrhal, obliterative, ulcerative, perforative, cystic.

The general pathology of appendicitis as shown by cases operated upon.—In describing the general pathology of appendicitis a brief review of the normal structure of the appendix is necessary. In its histological structure it resembles the large intestine, being composed of four coats, i. e., serous, muscular, submucous, and mucous.

The serous coat, or, more accurately speaking, the peritoneal, is the outermost coat, and is composed of a very thin layer of fibrous tissue, covered upon its outer surface by a layer of endothelial cells.

The muscular coat is composed of an external layer of longitudinal fibers and an internal layer of circular fibers. Normally the longitudinal layer of fibers is much thinner than the inner or circular layer, which is thick and strong.

The submucous coat normally is rather thin and composed of a very loose connective tissue which supports the blood vessels, lymphatics, and nerves. It also connects the circular muscular coat to the mucous coat.

The mucous coat, or mucosa, is the most interesting form from a pathological standpoint, as it is here that the first changes take place in disease of the appendix. It is devoid of villi and Peyer's patches, as is the large intestine generally, and consists of a base of adenoid tissue supporting a large number of simple tubular glands of Lieberkuhn. These glands rest upon a very narrow mucosa. The mucous layer also contains a large number of the so-called solitary glands or follicles.

Embedded in the adenoid tissue lie the tubular glands, each consisting of a delicate membrane, lined by a row of columnar epithelium, which is continuous with the lining of the mucous coat. The tubular glands in the appendix are much longer than the similar glands in the small intestine. The closed ends of these glands reach nearly to the muscularis mucosæ. The solitary glands or follicles are masses of adenoid tissue, generally oval in shape and filled with leucocytes. Their lower border

projects into the submucous layer while their apices lie in the mucous layer, being covered by the tubular glands and the epithelium lining the appendix. These glands are surrounded by lymphatics, and are quite numerous.

Lining the entire interior of the appendix is a delicate layer of epithelium continuous with that lining the glands of Lieberkuhn.

Having thus briefly considered the normal histology of the appendix, a better understanding is possible of the pathological changes which may occur in the various forms of appendicitis.

The pathological changes met with vary from those of a simple inflammation, with a limited invasion of the tissues by leucocytes, to pus formation, ulceration, and necrosis of the entire wall of the appendix in places, and consequently perforation. The specimens examined embrace all the stages mentioned, from the slightly inflamed appendix containing no pus to the necrosed and perforated appendix filled with purulent exudation. Of those examined eleven were diagnosed clinically as cases of recurrent appendicitis. Of these the appendix was examined microscopically in fifteen, sections being cut out and stained and photomicrographs prepared.

Taken as a whole the specimens sectioned may be divided as regards the pathological changes present into the following classes, i. e., catarrhal, obliterative, ulcerative, perforative, and cystic.

The catarrhal type.—This, the mildest type of appendicitis as regards the pathological changes present, is characterized by congestion of the mucous coat, infiltration of the mucous coat and submucous coat by leucocytes, and the production of more or less mucus within the appendicular canal. There were only two instances of this rapidity of the disease examined—the cases of C. A., private, Hospital Corps, United States Army, and Private J. C., Company H, Sixteenth United States Infantry.

In the latter case the lesions found were very typical, and essentially as follows: The adenoid tissue between the tubular glands was thickly infiltrated by leucocytes, in some places so much so as to compress the glands. Many of the glands were actively secreting mucous which bathed the surface of the glandular layer, having destroyed the delicate epithelium covering it. The appendicular canal contained much thick mucous. Large hemorrhagic areas have been formed in both the submucous and external muscular coats, due to rupture of the small capillaries in those regions brought about by their distension with blood. The submucous coat, besides containing these hemorrhagic areas, show some infiltration by leucocytes. A peculiar feature noticed was that some of the solitary follicles seem to have been replaced by hemorrhagic areas. The circular and longitudinal layers preserve their relative thickness and were not infiltrated by leucocytes. In this type of appendicitis the chief changes are found in the glandular layers of the mucous coat, consisting in an infiltration of the adenoid tissue by leucocytes, which has produced a large amount of mucus, together with the congestion of blood vessels of the entire appendix. The naked-eye appearance of the appendix in the cases of catarrhal inflammation is not very diagnostic. The appendix may seem to be a little or not at all inflamed externally, although there may be extensive catarrhal condition present.

In the case of A., the catarrhal inflammation had caused so much inflammation of the glandular layer by leucocytes as to obliterate a destruction of the glands. This condition is only present in cases which have suffered for some time with an attack, or from repeated attacks. It is not an ulceration, but the inflammation of leucocytes seem simply to occlude and cut off the glands. The condition of catarrhal inflammation will undoubtedly lead to repeated attacks, any of which may result in ulceration and perforation, if allowed to run their course.

The obliterative type.—This type of appendicitis was present in two of the cases examined, i. e., Lieutenant J. R., Sixth United States Cavalry, and Private E., Twenty-First United States Infantry. The pathological changes found in the obliterative appendicitis occurred only in those cases which had had more than one attack—that is, in recurrent appendicitis. Obliterative changes, however, do not occur in the majority of cases where, for some unknown reason, a reproductive instead of a destructive process results. The changes present consist essentially in the production of newly formed tissue in regions where it is normally present, as in the mucous layer. It is really a cirrhosis of the appendix, the mucous layer being crowded out, so to speak, by the newly formed connective tissue, which eventually entirely occludes the appendicular canal. The changes in the mucous coat consist in a great thickening and infiltration of it by numerous leucocytes, young connective tissue cells, and fibriles of connective tissue.

In the appendix of Lieutenant R. this condition is well illustrated. The canal of the appendix was entirely filled with new tissue, composed of fibers and multitudes of leucocytes and connective tissue cells. In some places this newly formed tissue had become vascular, small blood vessels having formed which supplied it with

nourishment. The glandular layer had entirely disappeared, no trace of the glandular structure being visible in any portion.

In the case of Private E. the entire canal was occluded with newly formed connective tissue, and in places large hemorrhagic areas had formed, evidently due to the rupture of the capillaries in the vicinity. The structure of the mucous coat in this case was entirely lost, save for a few isolated glands surrounded by much fibrous tissue. The submucous coat in cases of obliterative appendicitis is generally thickly infiltrated by leucocytes, much thickened and very fibrous. The muscular coats are somewhat thickened, especially the circular muscular coat, and are infiltrated by comparatively few leucocytes.

The result in cases of obliterative appendicitis, as shown by the pathological changes, would in most instances be necrosis and perforation. The newly formed connective tissue, unless amply supplied with blood, will degenerate and ultimately necrosis will take place. In a few instances obliterative changes may occur and the newly formed tissue be so well supplied with blood vessels that the result would be simply the shutting off of the appendix, which, provided that it take place at the extremity of the appendix, will not result in harm to the patient. If, however, the obliteration takes place at any other portion of the appendix, the closing up of the portion between it and the extremity will almost certainly result in ulceration and perforation after repeated attacks. The changes present in obliterative appendicitis is most noticeable in the mucous and submucous coats, and consists essentially in the rapid production of newly formed connective tissue which replaces the normal structure of the appendix.

The ulcerative type.—The ulcerative type of appendicitis was found in all the cases examined. This condition is simply a step in the process toward perforation, and while pathologically it presents certain definite features, which, it should be remembered, occur in either acute or chronic cases, and only shows that the process present is only destructive in character, the ulceration varies in extent. There may be but a slight ulceration of the mucous coat, or ulceration extending through the mucous and submucous coats, or ulceration extending through the peritoneal coat. In each the appearances presented are somewhat different in the structures which are affected. In cases where the ulceration extends only to the submucous coat the mucous layer may be intact, save in the ulcerative areas. In such areas the mucous membrane is destroyed down to the submucous coat, the walls of the ulceration being thickly infiltrated by leucocytes, as is also the mucous membrane where no ulceration has occurred. The submucous coat is generally very thickly infiltrated by leucocytes and the solitary follicles are swollen and densely packed with lymphoid cells. As a rule the internal muscular coat is thickly infiltrated by leucocytes, while the external one is generally not affected. This is the most simple and mildest type of appendicitis.

In cases where the ulceration is extended to the muscular coat, the mucous layer of the appendix is very likely to become much degenerated, owing to the extensive infiltration by leucocytes and the consequent pressure upon the tubule. The large areas of mucous membrane may show no glandular structure whatever, this result being due to necrosis. Where the ulceration has taken place the coats of the appendix are especially affected, being greatly infiltrated by leucocytes, the submucous and mucous coats often being indistinguishable from each other, the tubular glands having entirely disappeared and the hemorrhagic areas being present in both the submucous and mucous coats. The internal muscular coat is generally thickly infiltrated by leucocytes, very greatly thickened, sometimes being almost as thick as the normal thickness of the appendix. The mucous layer may be very greatly thickened, so much so as to almost close the appendicular canal. Where the ulceration is extended to the peritoneal coat, the appearances presented are essentially the same, save that the muscular coats are apt to be somewhat thin on account of the pressure of the exudation which is present in the canal. The result in such cases would eventually be perforation, as the amount of tissue involved and the severe character of the ulceration would lead invariably to the destruction of the entire wall of the appendix.

The perforative type.—The perforative type of appendicitis is, from a pathological standpoint, simply the culminating stage which is first evidenced by catarrhal inflammation. The simple catarrhal inflammation ends eventually in ulceration and the ulceration in perforation of the appendix. It is then simply the last step in the inflammatory process. The conditions present are similar to those found in ulcerative appendicitis, save that the ulceration has extended through the peritoneal coat. Very various are the pathological changes found in the appendix which has undergone perforation. The portion farthest away from the perforation, when sectioned, generally shows the catarrhal inflammation, and the nearer the perforation is approached the greater the ulceration present and the more extensive the destruction of the

various layers of the appendix. To describe them, the pathology of the appendix in cases where perforation has occurred would be but a repetition of the conditions already described, the only difference being that in the cases which are perforated the lesions are much more severe than in others. The mucous membrane may be entirely destroyed or it may be ulcerated in places. The submucous coat may be so thickly infiltrated by leucocytes as to be indistinguishable. The muscular coat may be thickened or thinner than the normal, or always greatly infiltrated by leucocytes, and in most instances this infiltration has caused a separation of the bundles of muscular fibers. To describe all the pathological changes found in the sections from the appendix would require a volume of needless repetition. The process is simply one of inflammation, acute or chronic, leading ultimately to destruction of the various coats of the appendix, the appearances presented varying with the tissues attacked and the rapidity or slowness of the inflammatory action.

The cystic type.—In one case a true cyst occupied the extremity of the appendix. This case gave a history of recurrent attacks. Microscopically, the extremity of the appendix was very greatly enlarged and filled with true cystic fluid, the cyst when opened measuring one-half centimeter in diameter. The condition found microscopically is described under the case of L. G., quartermaster employee, and will not be repeated here. This case is interesting as it shows the formation of a true cyst, with typical structure, after repeated attacks of inflammation. The cystic wall was typical in every respect. This cystic condition is of very rare occurrence.

In summing up the pathology of appendicitis as shown by these specimens, it will be seen how the process is generally a progressive one, and how dangerous the consequences are apt to be if the simplest catarrhal inflammation is allowed to continue for any length of time. As to the etiological factor concerning the production of the disease, it would appear that any irritant substance capable of exciting inflammation will be all that is needed for the production of an attack of appendicitis. It is undoubtedly due to the invasion of the tissue of the appendix by bacteria, notably the bacillus coli communis, which invasion is made possible by the destruction, in some way, of the guarding layer of epithelium. I can see, however, how a purely mechanical cause, such as a foreign body might, by continued irritation, cause an exudation, which, being confined in the small canal of the appendix, might, by compression, cause necrosis and perforation, without the aid of bacteria, but I believe that in the vast majority of cases the bacillus coli communis is the chief factor in the etiology of the disease.

Briefly stated, then, the pathology of appendicitis may be summed up as follows:

1. An injury to the delicate epithelium lining the interior of the appendix, and constituting its protective barrier.

2. The invasion of the mucous membrane and submucous tissue, rich in lymphatics and blood vessels, by bacteria, chiefly the bacillus coli communis.

3. The infiltration of these layers by leucocytes, which have rallied to repel the invasion, and consequently swelling of the mucous and submucous layers with some exudation.

4. The invasion of the muscular coat by bacteria and leucocytes, with the destruction of the mucous and submucous layers, and the formation of areas of necrosis and ulceration, due to pressure, impaired blood supply, and microbial poisons.

5. The entire destruction, in parts, of the mucous, submucous, muscular, and serous coats, and consequently perforation of the appendix.

As to the causal factor, that which produces the lesion in the epithelium, I believe that there is more than one. Any mechanical, chemical, or bacterial agency capable of injuring this delicate tissue, may be concerned. I do not believe that the primal cause is often bacterial, but after an injury has occurred I believe that the pathological changes which then begin are due to the invasion of the rich lymphatic tissue by bacteria, the chief of which is the bacillus coli communis.

Nuclein and malaria. By direction of the commanding officer, I have conducted an investigation upon the influence of a preparation known as "nuclein," upon the parasites of malarial fever, as shown by the examination of the blood in certain cases in which it was administered. I have the records of 35 cases reported to me by the attending surgeon, in which the blood examinations were made every other day, and the effect of the medicine carefully noted. Of these 35 cases, 10 were infections with the tertian parasite, 2 with the quartan parasite, and 23 with the estivo-autumnal parasite. Of the whole number, 15 were treated with nuclein alone, and these will be reported upon first. Of these, 8 were infections with the tertian parasite, 2 with the quartan parasite, and 5 with the estivo-autumnal parasite.

Infections with the tertian parasite.—In the eight infections with the tertian parasite the remedy was entirely valueless in so far as preventing the paroxysm was concerned. The parasites remained as numerous in the blood as before the administartion of the remedy, and the paroxysms occurred as usual.

Infections with the quartan parasite.—In the two cases infected with the quartan parasite nuclein was valueless. Paroxysms arrived promptly and were very severe. In one case the proof is very positive that the remedy is powerless in the intermittent malarias. This case showed the quartan parasites in the blood before any definite clinical symptoms were manifest. Nuclein was at once administered and the blood examined every day. Day by day the parasites became more numerous, until at last, several days after beginning treatment, the patient had a severe paroxysm. From this case it will be seen that not only is the remedy unable to prevent the paroxysms after they have once become established, but it is powerless to prevent a paroxysm when only a few parasites are found in the blood and no clinical symptom has as yet appeared.

Infections with the estivo-autumnal parasite.—In these cases the evidence as to the effect of nuclein is contradictory. In two of the cases—one showing numerous ring forms of the tertian estivo-autumnal parasites and numerous crescents, and the other ring forms and pigmented intracellular bodies—nuclein caused the disappearance of the parasites after three days' treatment. I can not say that the disappearance was due to other factors than the nuclein. In the three other cases nuclein had no effect whatever upon the parasites.

From these cases it would be seen that the remedy is probably of no specific therapeutic value in the malarial fevers.

Of the twenty cases in which nuclein was administered along with quinine, the effect of the drug is still in doubt. From the examinations of the blood, it was seen that a marked leucocytosis was produced during the first week of its administration, after which the leucocytes remained stationary. The clinical evidence is still more conflicting, as some of the surgeons that have used it claim that it had no beneficial effect, while others thought that it rendered recovery from malaria more complete and rapid.

There is no doubt that the nuclein does cause an increase in the number of the leucocytes, and that, when it is given, phagocytosis is more active, but this alone does not seem to be sufficient to cure the malarial fever. It is not reasonable to suppose that any remedy will so increase the phagocytes as to result in a recovery due to phagocytosis alone. Even in the most pernicious cases of estivo-autumnal malaria, phagocytosis is very active, more so than in the mild cases, which conclusively proves that it has little to do with the recovery from the disease.

From my observation I would conclude that nuclein is a valuable adjunct, along with quinine, in the treatment of the malarial fevers, but that of itself it is not able to effect a cure.

Observations upon the bacillus of Shiga in relation to dysentery.—I have continued my observations upon a bacillus separated from the intestine at autopsy of these cases of dysentery and it has proven to be the same as that discovered by Shiga in Japan and studied very carefully by Flexner and Strong in Manila. This bacillus has proven to be the cause of the acute specific dysentery prevalent in Japan and the Philippines. Cultural peculiarities and the morphology of the organism has been so fully described by the observers quoted that I shall not enter into a description here. I have devoted the most of my attention to the agglutination test and to the effect of the bacillus upon animals. As regards the latter I may say that the results have been so contradictory that I have been unable to draw any positive conclusion from them.

It has been found that this bacillus, which much resembles that of typhoid, will agglutinate when placed in the blood serum of a patient suffering from certain forms of dysentery, designated as an acute specific dysentery.

Using the same method as is used for the Widal test and substituting this bacillus, I have tested the blood serum of 70 cases of dysentery. In making the test I have used a dilution of 1 to 10 and have allowed a time limit of fifteen minutes. The cases tested were all diagnosed as chronic dysentery, and of the 70 cases 20 of them showed the amœbæ in the fæces and were therefore amœbic dysentery. The results of the tests were as follows:

1. Of the 20 amœbic cases only 1 gave a reaction, which was very slight. This case came to autopsy and was found to be a typical case of amœbic dysentery. It was impossible to ascertain whether or not the patient had previously had an attack of the specific variety.

2. Of the 50 remaining cases 21 gave a positive reaction and 29 negative. Of the positive cases 5 came to autopsy, and the pathological conditions present were those of severe diphtheritic dysentery, the ulcerations being very superficial in character and the entire large intestine covered with a thin necrotic membrane covering in the ulcerations. I am satisfied that these cases were the chronic form of the acute specific dysentery observed in the Philippines.

Of the 29 negative cases only 2 came to autopsy, and they were both of the gangrenous type of dysentery.

As a result of these examinations I am inclined to believe that the agglutinated test of Shiga's bacillus is comparable in accuracy with the Widal test. Perhaps this conclusion is a little premature, but the fact that the bacillus does not react in the cases of amœbic dysentery is very significant. I believe, however, that investigations of this test in the acute cases would be more satisfactory.

Large numbers of cultures and smears have been made from cases of suspected diphtheria, but only 1 case proved positive.

Analyses have been made of milk supplied to this hospital, which was found as a rule to be in a satisfactory condition.

(6.) AUTOPSIES.

The number of autopsies and the cause of death in the cases autopsied has already been referred to in a section of this report treating of the examinations of post-mortem material.

In conclusion, I have the honor to state that the laboratory is excellently equipped and the apparatus is in good condition.

X-RAY LABORATORY.

During the year a large amount of work has been done in the X-ray laboratory consisting of fluoroscopic examinations and the taking of radiographs. The work has been done with a static machine which has proved very satisfactory, the one objection to it being the tendency of slight moisture to discharge the machine. This, however, has not affected its utility during the last six months. Besides the use of the static machine for radiographic purposes, it has also been used in the treatment, by electricity, of certain nervous diseases and myalgia.

The exact number of fluoroscopic examinations made has not been recorded, but will range somewhere between 125 and 150. These examinations have proven of great value in locating bullets, which were afterwards removed by operation; in detecting the amount of injury to the bone from gunshot wounds, and in the treatment of fractures.

During the six months ending June 30, 1901, there were 25 fluoroscopic examinations made to ascertain if the bone had been injured or a bullet remained in the tissues in certain cases, all of which resulted negatively. These examinations are of interest as showing how easy it is in such cases to ascertain by the X-ray the condition present and how difficult it is clinically, in many instances, to make a diagnosis. These negative examinations were divided as follows:

Suspected fractures	10
Suspected luxations	2
Suspected aneurism of the arch of the aorta	1
Gunshot wound (to ascertain if bullet remained)	12

The total number of radiographs made since January 1, 1901, has been 92. These are divided as follows:

Gunshot wound of—	
Chest	6
Shoulder	4
Arm	4
Elbow	3
Forearm	4
Hand	6
Pelvis	3
Hip	7
Thigh	7
Knee	3
Leg	5
Foot	4
Fracture of—	
Phalanges of hand	5
Humerus	2
Femur	1
Patella	1
Tibia and fibula	6
Clavicle	1
Inferior maxilla	1
Miscellaneous	19
Total	92

A copy of these radiographs will be submitted very shortly.

The total number of patients examined in the X-ray clinic since January 1, 1901, has been 117, divided as follows:

Regulars	47
Volunteers	65
Civilians	5
Total	117

The X-ray laboratory and electrical department are equipped with a Morton-Wimshurst-Holtz ten-plate static machine with full set of electrodes, one-fifth horse-power motor, Cleaves current controller, Cyrus Edson's ozone inhaler, Monell's interrupters, Crookes' tubes, fluoroscopes with barium-platino-cyanide screens, and complete equipment for radiograph work. This work has been much improved by better facilities in the photographic department. A commodious dark room was built, fitted with sinks, water supply, and electric connections. A 15-inch burnisher and a 26-inch print trimmer, with trays, printing frames, and other necessaries have been added to the outfit.

It has been found that it is necessary to have an experienced operator to obtain the best results in radiographic work, no matter what kind of a machine is used and what methods are used in completing the photographic process. The following are the principal points to be taken into consideration in the production of good radiographs:

(*a*) Current generated and uniformity of same.
(*b*) Kind of tube used and state of vacuum.
(*c*) Region of the body to be radiographed and thickness of individual.
(*d*) Distance of tube from the body.
(*e*) Sensitiveness of the plate.

After exposure the process is comparatively simple, although some developers give better definition than others and the paper used for printing should be carefully selected. At this hospital the metol-pyro solution has been found to be the best developer and the solio paper has given the best satisfaction for printing purposes.

REPORT UPON INSANITY.

There have been 180 cases diagnosed as insane received at this hospital during the fiscal year. These cases have been cared for in the insanity ward, a small detached building on the eastern portion of the hospital grounds, which is well equipped for the care of such cases. Several times during the year the capacity of this small ward was exceeded and a few cases were cared for in the auxiliary wooden barracks. The ward for the care of the insane patients is in charge of a medical officer, who is assisted by two privates of the hospital corps. The patients are kept under observation at this hospital until a board, composed of three medical officers, is satisfied as to their condition, when those who are considered to be insane are sent to the Government Hospital for the Insane, at Washington, D. C., while those considered to be normal mentally are returned to duty or discharged as the case may be. A considerable number of soldiers returning to this country from the Philippines and diagnosed as insane, are found, upon arrival here, to be normal as regards their mental condition and are returned to duty, or, in the case of volunteers, discharged from the service.

The 180 cases diagnosed as insane received at this hospital during the year were divided as follows:

Regulars	96
Volunteers	78
Discharged soldiers	2
Prisoners	2
Civilians	2
Total	180

The following dispositions were made in these cases:

Transferred to Government Hospital for Insane, Washington, D. C	128
Returned to duty	34
Discharged on surgeon's certificate of disability	7
Discharged from the hospital	3
Mustered out with regiment	3

Transferred to Alcatraz Prison	1
Transferred to City Hospital, San Francisco, Cal	1
Died	2
Remaining in hospital for observation	1
Total	180

Diagnosis.—It has been exceedingly difficult in many instances to determine the exact form of insanity present in many of the cases, and it has been only after careful study and observation that the diagnosis could be determined. The 180 cases were divided as follows:

Acute melancholia	39
Melancholia simplex	11
Chronic melancholia	16
Acute or primary dementia	14
Secondary or terminal dementia	7
Primary delusional insanity	6
Chronic delusional insanity or paranoia	3
Alternating or circulating insanity	1
Acute mania	28
General paralysis of the insane	1
Epileptic insanity	1
Syphilitic insanity	1
Traumatic insanity	1
Morphomania	1
Monomania	2
Epilepsy (grand mal)	1
Nocturnal epilepsy	1
Insanity not confirmed	46
Total	180

During the year there have been 46 cases, diagnosed as insane received at this hospital in which the diagnosis was not confirmed. It is probably true that most of these cases, if not all, were insane at the time that they were transferred to this hospital, but the majority of them came from the Philippine Islands, and the voyage home, together with a more cheerful surrounding, resulted in the disappearance of the abnormal mental condition. Most of these cases were of the type of insanity in which the prognosis is good, and most of them were, without doubt, due to nostalgia and the depressing influence of campaigning in the tropics. Upon removal of this condition the return to the normal mental condition was rapid and complete. The diagnoses of the cases of insanity which were not confirmed were as follows:

Acute melancholia	15
Melancholia simplex	3
Chronic melancholia	1
Acute mania	4
Delusional insanity	1
Nostalgia	1
Neurasthenia	2
Chronic cephalalgia	2
Acute alcoholism	7
Chronic alcoholism	3
For observation	6
Total	46

Etiology.—The etiology of insanity in soldiers returned from the Philippine Islands is a subject which is at once simple and complex. Without doubt a large proportion of the cases which become insane have a hereditary taint which had not been discovered prior to enlistment. This, taken with the long distance from home, the intense heat of the tropical sun, constant harassment by an enemy which it is impossible to see, excessive use of alcoholics, and the depressing influences always present in a tropical climate, will account for the changed mental condition.

The influences just spoken of, even without the hereditary predisposition, are enough to produce, in a highly nervous individual, mild or even severe forms of insanity. It is safe to say, however, that the proportion of insanity in the Army does not exceed that in civil life in any large city, where the conditions of life approach the conditions found in the Philippines as regards social surroundings, etc.

It has also been found that the ratio of recovery in the case of soldiers returning from the Philippine Islands is much larger than that found in a corresponding number of individuals taken from civil life, and this goes simply to prove that the condition of insanity present has been only a temporary one, which rapidly disappeared upon transference to other conditions more favorable to the individual. Almost all of the cases of melancholia will be found upon examination to be due to nostalgia, and as a rule in these cases the prognosis is very favorable, provided the patient is transferred to the United States. It would be uninteresting and of no value to consider the etiology of the different forms of insanity present in soldiers, for all of them will be found upon examination to be due to one or more of the causes mentioned above.

THE FIRE.

Upon the afternoon of June 10, 1901, the northeastern portion of the hospital was destroyed by a fire which originated in the carpenter shop. One of the civilian employees of the hospital, without authority, was boiling paraffin over an oil stove, when it ignited, and before anything could be done the flames had spread to the inflammable material in the carpenter shop and to that portion of the hospital. The portion destroyed by fire included the patients' and hospital corps' dining rooms and kitchens; the medical, ordnance, quartermaster, and baggage storerooms; the carpenter and paint shops; ward F and a portion of ward G, with the tent hospital of forty-five tents. This fire involved a loss to the hospital of approximately $56,000. Since the fire a portion of ward G, which was partially destroyed, has been repaired and the fences on the north and east sides of the hospital, which were either torn down or burned, have been replaced. Ward H has been refitted as a patients' kitchen and dining room, two ranges having been set up and the chimey in the ward altered. A temporary stairway has been built in the front of this ward for use in taking supplies from the storerooms to the kitchen. A short time after the fire wards I and J, which were slightly damaged and emptied in order to save their contents, were refitted and made ready for occupancy.

At the time of the fire a strong wind from the southwest was blowing and the flames spread with the utmost rapidity, and although the fire was fought by the fire brigades of the hospital, the post, and the city, it was impossible to save the northeast portion of the hospital.

The losses to the general hospital by fire were as follows:

Buildings	$35,000.00
Medical property	14,991.52
Medical property to be inspected and condemned	3,173.02
Quartermaster property	5,597.16
Ordnance and ordnance stores	1,251.77

MEDICAL OFFICERS.

During the year 103 medical officers reported to this hospital for duty. Most of these officers were detailed on temporary duty while en route to the Philippine Islands. The following dispositions were made:

Transferred	96
Discharged the service	1
Sick	6
Temporary duty, awaiting transportation to the Philippine Islands	86

There have been 10 medical officers at this hospital during the year on permanent duty:

Regulars	3
Contract surgeons	7

POST-OFFICE.

Connected with the hospital is a branch post-office known as Station No. 1, Presidio. This office has proved of great convenience to the inmates of the hospital and has handled an immense amount of work during the year. The following tabulated statement of the money-order business from August, 1899, to July 25, 1901, published

ARMY GENERAL HOSPITAL, PRESIDIO OF SAN FRANCISCO, CAL., ON FIRE, JUNE 11, 1901.

by permission of the post-office inspectors, will give some idea of the large amount of business done at this office:

1899:	
August	$674.00
September	1,959.00
October	3,033.00
November	2,165.00
December	1,834.00
1900:	
January	1,564.00
February	1,355.00
March	2,323.00
April	873.00
May	775.00
June	2,081.00
July	1,228.00
August	1,698.00
September	5,708.00
October	1,188.00
1900:	
November	$1,112.00
December	1,270.00
1901:	
January	972.00
February	2,161.00
March	1,801.00
April	5,118.00
May	11,189.00
June	17,849.00
July	13,255.00
Total	83,185.00
Money orders paid and repaid	1,230.50
Total	84,415.50

In this period 2,525 money orders have been issued.

CONCLUSION.

In concluding this report, in which, owing to my performing the duties of chief surgeon of the department in addition to the administration of the hospital and its operative surgery, I have had to rely greatly on the reports of the medical officers in charge of the various departments, I desire to draw attention to the great harmony existing at the hospital during the year, medical officers, hospital corps, and female nurses vying with one another in making the institution the perfection of its kind. I am greatly indebted to Dr. Craig for the compilation of the data furnished, but particularly for his devoted and painstaking work in the bacteriological laboratory and at the post-mortem table, of which his report is a plain evidence. I have facilitated his work in every possible manner, principally by supplying him with a stenographer, which did away with the drudgery of writing.

Lieut. C. C. Collins, assistant surgeon, United States Army, has very intelligently filled the multiple offices of the executive, quartermaster, commissary, ordnance officer, and summary court, and deserves an ample share in the credit for the smooth working of the hospital. Capt. W. E. Purviance, assistant surgeon, was not selected by me as executive officer, because I needed his services in the supervision of the medical work of the wards, the examination of clinical histories, and consultation in medical cases. In addition to these I charged him with the presidency of the various boards for discharge, disposition of insane, etc., and he has had prepared under his supervision the final statements and discharges, as well as the certificates of disability, all of which required an officer of experience.

Lieutenant Hess, assistant surgeon, during his stay at this hospital, was a valuable assistant to Captain Purviance, and had in addition the charge of the voluminous muster rolls and clothing and descriptive books.

Dr. Clark, who had charge of the surgical wards, was of great value in his good judgment and in his correct enforcement of antisepsis, to which I owe the remarkable results obtained in surgery at this hospital.

Dr. William P. Banta has during the greater part of the year had charge of the X-ray apparatus and photographic work, and has made such improvements in equipment and its use that the radiographs produced in this laboratory are equal to any I have ever seen. Dr. Banta combined with this work the eye, ear, nose, and throat clinic, for which special facilities have been provided, and also the care and final disposition of the insane.

The other medical officers, Lieutenant Morse, Medical Department, Contract Surgeons McVean, Murtagh (now in the regular service), White, Barry, and Guitard, were more directly engaged in the service of the medical wards, and proved very zealous and satisfactory.

It would have been an impossibility to accomplish the great task of receiving in a hospital calculated to take care of 400 patients during a year over 5,000, feed, treat, and dispose of them according to the army system without devoted and intelligent assistants.

ARMY HOSPITAL SHIPS.

At the present time we have no army hospital ship. The *Relief* was used during the past year for service in the Philippine waters, but her great draft of water, which prevented her from entering many of the harbors and necessitated the transfer of sick for several miles in open boats, resulted in her transfer July 25, 1901, to the quartermaster's department as unsuited for special medical service.

An experiment was made in utilizing an army transport, the *Pennsylvania*, for the purpose of bringing sick men to Manila from outlying posts. This vessel left Manila October 5, 1900, with subsistence and quartermaster supplies for various southern garrisons and with accommodations for the return of 160 sick or wounded men. The hospital on the main deck consisted of four wards of 40 beds each, with dispensary, office, surgical dressing room, etc. Everything necessary for the welfare, convenience, and comfort of the sick was promptly furnished by the medical supply depot at Manila. This extemporized hospital ship brought back 155 cases to Manila on November 11, after a voyage of 2,322 miles. Among the cases were 46 of dysentery, 19 of malarial fever, 13 of diarrhea, 13 of wounds, and 6 of insanity. In every case there was marked improvement, a large proportion of the sick men being practically well by the time the vessel reached Manila, and no death occurred. It was deemed worthy of remark by the commanding surgeon, Maj. John S. Kulp, surgeon, United States Volunteers, that even the cases of insanity with no other treatment than generous food, illustrated papers, light airy surroundings, and constant companionship, improved so rapidly that any special guard over them seemed unnecessary before the end of the voyage.

The great objection to this ship was her draft of water, which prevented her from entering harbors and rendered difficult the transfer of sick from shore to ship.

The success of this voyage, notwithstanding unsatisfactory conditions and the prior successful use of the *Relief* for a similar purpose, originated the idea of making use of the supply trips of the latter vessel in giving the benefits of a sea voyage to invalids in the Manila hospitals who evidently were not improving by their hospital treatment. On the first trip of this character the *Relief* left Manila March 31, 1901, with 140 invalids. Fifty-one were collected on the trip. A careful examination on the return to Manila showed 29 returned to duty, 100 markedly benefited, and 60 somewhat better, but with no decided improvement. The change of air and food, the cool nights, and constant change of scenery had a decided effect for good on the majority of these cases. On several such voyages since then the *Relief* has been of material benefit to the sick, but always under the great disadvantage of her inability to come close to shore. These voyages demonstrated that a suitable light-draft ship devoted solely to the interests of the medical department is a necessity. Authority was therefore received from the Secretary of War for the purchase of a ship as a hospital transport, and measures are now on foot to accomplish this object, which will satisfactorily solve the questions of furnishing the departmental and district military hospitals in the Division of the Philippines with medical supplies, and of promptly removing such sick and wounded men as require transportation to Manila.

In a similar way daily outings have been given to convalescents

from the Manila hospitals on the Pasig River and Laguna de Bay on the hospital launch *New York*, which carries conveniently about 50 persons. A regular roster from her dock has been established, and each hospital in turn sends its quota of doctors, female nurses, and patients on successive days, the trip occupying three to four hours. The results have been very gratifying, even this little outing going a long way to relieve the tedium of the necessary confinement in hospital and hastening convalescence in many cases.

HEALTH OF THE ARMY.

The health of the Army must be regarded as having been unusually good during the calendar year 1900, the medical statistics of which are tabulated in the present report. To give a proper valuation to this statement the statistics of our Army from the time of the civil war must be taken into consideration. For many years after that war the admissions to sick report, discharges for disability, and deaths were somewhat similar to those reported during the past year, but then they were the result of service in the garrisons of the United States, while now they result from what practically has been war service in the Philippine Islands. Sanitary improvements in the condition of the soldier gradually lessened the rates, year after year subsequent to the civil war, among the troops in the United States, until in 1894 the admission rate from all causes fell to 1089.73 per thousand of strength. The lowest admission rate for disease was 830.65 in the year 1896; the lowest death rate from all causes was 5.11 per thousand of strength, 3.14 having been the rate for disease, both of which were recorded in the year 1897—the year preceding the great change in the sanitary environment of the soldier which resulted from the outbreak of the Spanish-American war. Following that outbreak, we had heavy rates of sickness and mortality, due to the exposures of active service in Cuba, Porto Rico, and the Philippine Islands. For a short time these rates were in excess of those of the civil war when at their worst, but the sanitary knowledge of the present time, put to energetic practical use, speedily caused a cessation of these excessive war rates, leaving the ratios still as high as those which prevailed in the garrisons of the United States for a number of years after the close of the civil war.

The increase in the ratios of admissions to sick report, discharges, and deaths during the past year over those of the years 1894–1897 is due to the relatively large proportion of our military force which served under war conditions in the Philippine Islands and China. But for this, the rates given by the Army would have made a very satisfactory record, as those given by troops serving in Cuba, Porto Rico, and the United States were by no means heavy.

The admission rate for all causes in the Army, volunteers and regulars, with a mean strength of 100,389 in 1900, was 2311.81 per thousand of strength, as compared with 2178.06 in the previous year; but during the year 1899 only 39,280 men out of a total of 105,546 were serving in the Philippines, while during the past year 66,882 of a total of 100,389 were thus serving. This is an important point to remember in considering the sick rates of the two years.

The troops serving in the United States during the year 1900 (mean strength 20,690) had an admission rate of 1510.97 per thousand of strength, as compared with 1677.51 during the previous year – 1242.87

from disease and 268.10 from injury, as compared with 1496.84 and 180.67, respectively, during 1899. The ratio for discharge was 39.29 per thousand of strength, as compared with 26.95 during the previous year; 32.52 of this rate was for disease and 6.77 for injury. The death rate did not differ much from that of the previous year. It was 7.78 from all causes per thousand of strength, as compared with 7.89 in the previous year; 4.83 from disease, as compared with 6.56 and 2.95 from injury, as compared with 1.33.

In the Philippine Islands, with a mean strength of 66,882, the admission rate was 2621.96, as compared with 2395.52 in the previous year, this increase being mainly due to disease among the volunteers, the ratio for which rose from 1859.21 to 2761.79. The regulars, on the other hand, showed a marked decrease in the ratio of admissions for disease, which fell from 2454.10 to 2197.73. Two-thirds of the admissions for disease were caused by malarial fevers and diarrheal diseases. The discharge rate among the volunteers, 12.98 per thousand of strength, was smaller than that of the regulars—22.46—probably because the volunteers were in expectation of a return home for muster out at an early date. The deaths from all causes amounted to 28.75 per thousand of strength, as compared with 30.58 in the previous year. Disease occasioned 20.26 deaths, the principal cause of the fatalities being dysentery, which, with other intestinal diseases, gave a rate of 9.08. The rate from injury amounted to 8.49.

The death rate in China was large, 47.76 per thousand of strength, 23.62 from disease, and 24.14 from injury, but fortunately the mean strength for the year was small, 1,947 men.

From the close of the calendar year 1900 to the latest reports, the health of the troops in the Philippines has been steadily improving. The chief surgeon has reported a progressive diminution in the nonefficiency of the command from disease and injury. In July and August, 1900, the nonefficiency constituted 9.47 and 9.58 per cent of the strength. From January to June, 1901, the nonefficiency was less than 7 per cent, the lowest rate 6.12 per cent, having been recorded in March. Intestinal and gastric diseases, including dysentery and typhoid fever, gave 34.22 per cent of the total sickness, malarial fevers 15.23 per cent, and venereal diseases 13.10 per cent. Typhoid fever, which scourged our camps in 1898, appeared only sporadically, constituting merely 1.78 per cent of the total sickness. Most of the malarial cases were mild and made little or no figure in the mortality returns. Smallpox, so prevalent and deadly in the early occupation of the islands, has almost entirely been suppressed. Dysentery, constituting 13.44 per cent of all cases of sickness, is the dangerous disease. Bubonic plague, although a subject of importance to the medical officers, members of the board of health of Manila, and to those temporarily assigned for duty with the board as inspectors, on account of its prevalence among Chinese and Filipinos, appears to have given but little anxiety to medical officers serving with troops, as during the year only one case was reported as having occurred in the army in the person of an enlisted Chinese cook of the Twenty-seventh Infantry at Camp Stotsenberg, near Manila, the infection having undoubtedly been contracted in the city. Quarantine and disinfection prevented any extension of the disease.

The health of the troops serving in Cuba was excellent during the year. With a mean strength of 8,690 the admission rate was 1873.07

as compared with 2749.74 in 1899, the rate for disease having been 1586.19 as compared with 2537.98. Discharges for disability amounted to 16.57 per thousand of strength as against 20.25 during the previous year and the death rate from all causes was 3.78 as against 18.30 in 1899. Malarial diseases contributed 581.35 to the admission rate, but the death rate from these cases was only 1.04 per thousand of strength. Dysentery and diarrheal diseases constituted 166.75 of the admission rate, but only 0.58 of the death rate. But for the occurrence of yellow fever the death rate from the disease in this command would have been only 4.72 per thousand of strength. One hundred and forty-four cases were reported, of which 32 were fatal, giving a death rate of 3.08 per thousand of strength, the rate for all diseases being 8.40 and for all diseases and injuries 9.78. Since the close of the calendar year the health of the troops has continued good. Under date of July 22, 1901, the chief surgeon reported that since November, 1900, the only cases of yellow fever that had occurred in our military garrisons were the nine cases in the persons of men who were experimentally inoculated by infected mosquitoes at Quemados. See page 177.

Maj. V. Havard, surgeon, United States Army, chief surgeon, Department of Cuba, makes note of the fact that the admission rate for disease in the garrisons of the eastern half of the island of Cuba is nearly double that of the troops serving in the western half. This is due to the greater prevalence of malarial fevers and diarrheal diseases in the eastern provinces. See page 145.

As a result of the American occupation of the island every city has its health officer and every inland town where troops are stationed has had its sanitary condition more or less improved by the energy of the post commander and medical officer, the latter acting as a sanitary inspector for the municipality.

In Havana the work of sanitation has been prosecuted with vigor by Maj. W. C. Gorgas, surgeon, United States Army, the chief sanitary officer. His systematic efforts to destroy mosquitoes, which are now recognized to be the chief agents in the propagation of malarial and yellow fevers, have achieved the most gratifying results. During the first six months of 1900 the mortality from malarial fever was 247; during the last six months, 97, and during the first six months of 1901 only 75. As to yellow fever, there were 24 deaths in the city during the first six months of 1900, 285 in the last six months, 17 in the first three months of 1901, and none in the three months ending June 30, 1901, during which the machinery of the health department for the control of the disease under our recently discovered knowledge as to its propagation became perfected. Any further improvement in the sanitation of the city must depend on an approved sewerage system and on the gradual improvement of the local sanitary conditions.

The medical record of the troops in Porto Rico for the year 1900 is an excellent one, comparing favorably with that of the troops serving at the home stations. With a mean strength of 2,180 for the year, the admission rate for all causes of disability was 1,577.98, as compared with 2,522.40 during the previous year. The rate for disease was 1,397.71 and for injury 180.27, as compared, respectively, with 2,255.97 and 266.43 in 1899. The discharges for disability amounted to 15.14 per thousand of strength, compared with 19.85 in the previous year. These discharges were mainly for consumption and diarrheal diseases. The death rate was only 5.05 per thousand of strength,

as against 11.27 in 1899. All the deaths were the result of disease. It will be observed that this death rate is lower than the lowest recorded death rate in our Army—5.11 per thousand in 1897 in the carefully supervised garrisons of the United States prior to the sanitary change made by the outbreak of the Spanish-American war. Venereal diseases caused 367.88 of the admissions per thousand of strength. Were these deducted the admission rate for disease would fall to 1,029.83. Malarial diseases had an admission rate of 247.25 and diarrheal diseases 148.17 per thousand of the strength.

Special attention has been paid by medical officers during the year to the purity of the water supplies used by their commands. As a rule all doubtful supplies have been boiled before use for drinking. Orders and circulars have been issued by post and company commanders concerning the danger from typhoid fever, dysentery, intestinal parasites, and other abdominal diseases by the use of impure surface water. In the Philippines the Waterhouse-Forbes sterilizers described in my report for the year ended June 30, 1899, pages 215–225, are in use throughout the islands and give the utmost satisfaction, although care in their management must be taken to insure a thorough sterilization. With troops new to the islands the utmost care on the part of officers is necessary to prevent dangerous results from the use of impure water.

The following letter, dated May 22, 1901, from Brig. Gen. A. W. Greely, chief signal officer, United States Army, to the Adjutant-General of the Army, shows that service in the Division of the Philippines does not involve a large noneffectiveness from sickness if the men are intelligent and take care of themselves:

SIR: As a matter of official interest to the Secretary of War, the Commissary-General of Subsistence, and the Surgeon-General, I have the honor to state that the official reports of Lieut. Col. James Allen, chief signal officer, Division of the Philippines, show that at the end of February, 1901, there were serving in the Philippines 31 officers and 517 enlisted men of the Signal Corps, of whom there were reported sick no officers and 7 enlisted men.

It may be added that the duties of the enlisted men of the Signal Corps are such as to cause them to serve at widely separated posts under adverse conditions.

First Lieut. Leonard D. Wildman, commanding Company H, who reports only 1 man sick out of an aggregate of 113, says: "The health of the command is unusually good. * * * It is largely due to the care the men take of themselves and the fact that the ration, supplemented by native vegetables, is a very wholesome one. Nearly every man in the company has had his turn at line work in the field or as signalman with some expedition. The variety of work is also accountable in a measure for their health. A few men, however, have broken down and have been brought to the headquarters and given lighter work and more exercise. The operators, who are on duty twenty-four hours per day, are the first to give way. Men who have the hardest work and most exercise seem to be well."

This surprising condition of health is practical evidence of the efficiency of the commissary and medical departments when supplemented by the supervision of a careful commanding officer. It is a record of the condition of military affairs in the Philippines, of special interest at this time, when many unwarranted adverse criticisms of the Army are being made.

REPORT OF COL. CHARLES R. GREENLEAF, ASSISTANT SURGEON-GENERAL, UNITED STATES ARMY, CHIEF SURGEON DIVISION OF THE PHILIPPINES, MANILA, P. I., MAY 31, 1901.

I have the honor, prior to my departure for the United States, to submit a report of the operations of the medical department in the Division of the Philippines for the period ending May 31, 1901:

HEALTH OF THE ARMY.

The health of the troops continues to be good, and the ratio of noneffectives to the whole strength has still further diminished. The average for the seven months covered by my last report was 8.84 per cent; for nine months ending March 31 the

average is 7.52 per cent; the month of August gives the highest, 9.47 per cent, and March the lowest, 6.12 per cent. As the reports of sick and wounded for April are not all in at the time this report is made, accurate statistics are not available for that month and for May.

Aggregate numerical sick report, by months.

	Strength.	Noneffective.	Per cent.
1900.			
July	61,392	5,811	9.47
August	60,702	5,817	9.58
September	64,225	5,451	8.49
October	67,866	4,977	7.33
November	68,436	4,937	7.21
December	68,465	4,682	6.84
1901.			
January	68,043	4,297	6.37
February	63,127	4,077	6.46
March	56,791	3,478	6.12
Average			7.52

The principal diseases for the same period give the following rates:

Disease.	Average per cent of total sick for period.	Maximum monthly.	Minimum monthly.
Typhoid fever	1.78	2.23	1.25
Malarial fever	15.23	21.45	10.48
Dysentery	13.44	15.96	11.92
Diarrhea	12.85	19.01	6.91
Other intestinal	2.63	4.43	1.46
Gastric	3.54	4.95	2.26
Wounds and injuries	10.31	12.12	7.68
Venereal	13.18	20.42	8.97

Intestinal and gastric diseases, including dysentery and typhoid fever, therefore give 34.22 per cent of total sickness; malarial fever and sequelae next with 15.23 per cent, and venereal diseases third with 13.18 per cent.

The great improvement in the effective rate to total strength is to a certain extent, no doubt, due to still greater care in sanitation, but the greatest factor is that the regiments have been gradually weeded of their weaklings and chronic invalids. The immature youths, the hard drinkers, and the recruits with inherited or acquired weakness of constitution, have gradually, after repeated appearance on the sick report, and running the circuit of various hospitals, been sent to the United States. Service in the Philippines shows on a grand scale the operation of the law of the survival of the fittest, and the volunteer troops give us the best example of this, because they have received no recruits since their arrival in the islands. The seasoned men who pass a year in the Tropics, of strong constitution, observing the ordinary hygienic rules, and old enough to be moderate in their appetites, should show a small sick rate were it not for two adverse factors.

The first is the inevitable undermining of the strength of the most robust by continued service in the Tropics, and the second is the increasing prevalence of venereal diseases.

The most energetic and stalwart American after a year of service here loses energy, strength, and ambition. He performs what work his duty demands more or less half-heartedly and with a draft on his vital energy that he can actually feel at the time. Slight ailments, to which a second thought would not be given in the United States, are felt out of all proportion to their severity. The most valuable work of the medical officer with troops in camps and garrisons consists of judiciously advising and treating this class of cases—the slight ailments of men who do, or are striving to do, their full duty and who honestly dislike their names to appear on the sick list.

Typhoid fever has not existed as an epidemic anywhere. A few sporadic cases occurred from time to time at different places, and do not appear to have been occasioned by neglect on the part of medical or line officers. Individual carelessness on the part of men, drinking other water than that sterilized and provided for them, and consuming native-made lemonade, ice cream, etc., has probably caused typhoid fever

in great part. The average, 1.78 per cent, of the total sickness for the period is a decrease, which indicates good sanitation and on the whole is satisfactory.

Malarial fever shows as usual the highest rate, although its average, 15.23 per cent, is a decrease from last report. I do not think that the actual prevalence of malarial fever is indicated by this figure, as many men have occasional slight attacks who do not appear on sick report at all.

The use of the mosquito bar is general and the men understand and appreciate the fact that it prevents the inoculation of malarial poison by mosquitoes.

The very great majority of malarial cases are comparatively mild. Pernicious fever with fatal results does exist in some parts of the island, but such places are nearly uninhabited and avoided by the natives. The nature of this malignant fever is not yet understood by us.

Dysentery does not show much variation, with an average of 13.44 per cent of all sickness. I believe there is a real decrease, notwithstanding the fact that the figures are a little higher than last year. More microscopes are now in use throughout the provinces and many cases are now detected at the outset that might have, under conditions of active field service, been classed as diarrhea. The detection of the amœba coli is very important, as tropical dysentery is apt to be very deceptive at the beginning.

In diarrheal and gastric diseases there has been a slight increase in proportion, due, I believe, to long service in the Tropics. Most of the slight troubles of the well men who are doing full duty come under this head, and few escape an occasional day or two on sick report with a diarrhea or slight gastric derangement. Many of these cases are probably caused by intestinal parasites, of which there are many varieties in the Philippines. It is difficult to detect some of these without microscopical examinations, and as serious illness is rarely produced by them other than the amœba dysenteriæ it probably happens that they often escape observation.

There was one case of bubonic plague in an enlisted Chinese cook of the Twenty-seventh Infantry, United States Volunteers, at Camp Stotsenberg, near Manila, undoubtedly contracted in the city. Strict quarantine and thorough disinfection prevented any extension of the disease, and the patient recovered.

Smallpox has existed in much less degree than before, but has not yet disappeared totally. Vaccinations have been repeated where unsuccessful as often as ten times during a year's time; the fresh lymph prepared in Manila from caraboa calves acts promptly with a characteristic vesicle and causes little suffering. Some complaint has been made of its nonefficiency at remote stations, and as the difficulty in this climate of transporting lymph promptly and keeping it cool is very great it is probable that time and heat soon cause the virus to deteriorate.

It is an interesting fact that heat stroke generally so much feared in the Tropics is practically unknown here; men often drop out on the march overcome by heat, but fatal stroke and lasting heat exhaustion is very rare.

Wounds and injuries show very little variation, and the proportion of these inflicted by the enemy remains large enough to indicate that, although large movements of troops have ceased the army has, nevertheless, been engaged in about as much marching, skirmishing, and fighting as ever until the last two or three months. From August 1, 1900, to April 30, 1901, in addition to 165 killed in action, 24 died of wounds and 366 received wounds not fatal.

The transports *Meade*, *Indiana*, and *Hancock*, arriving in April, brought many cases of mumps and measles, and each succeeding vessel seems to have these diseases aboard. In this connection it would be interesting to know if the clothing supplied to recruits at Presidio possibly carries this infection from having been made in sweat houses or crowded tenements.

The steady increase in venereal diseases among our troops, from 8.97 per cent in September, 1900, to 20.42 per cent of total sickness in April, furnishes ground for the greatest apprehension, and is an item not exceeded in importance by any other affecting the health and efficiency of the army in the Philippines.

Lest our forces become seriously crippled and an irreparable injury be done the people of these islands by those whose object is to help and elevate them, the subject must be looked at squarely in the face and dealt with as any other contagious disease.

Syphilis is fortunately not the most prevalent of these, and exists in the proportion of about one out of every seven cases of venereal disease. Gonorrhea of a very obstinate nature, and chancroid are about equally prevalent. The latter causes in nearly every case complete noneffectiveness on account of suppurating bubo. A soft sore, very minute, often touched with caustic by the man himself, may heal so promptly that the scar can scarcely be seen; nevertheless a bubo seems inevitable, requiring treatment in hospital and operation.

Venereal disease has of course always existed in Manila and the larger seaports of the Philippines, but much has been imported into Manila by women from Europe, America, and Japan, and by soldiers and sailors.

The native woman outside of the city has hitherto as a rule been free from disease, but it is she who, when infected, will be at once the greatest sufferer and the greatest menance to the public health, because she will have neither means, knowledge, nor opportunity requisite to a cure.

This class of disease is spreading from Manila as a focus into the provinces, and as amicable relations are now nearly universal between Americans and natives it is likely that a large number of women will be infected, and with little prospect of cure.

A segregation of this class of women in Manila to a certain part of the town, a supervision of their health, and a duly recorded treatment of the diseased, should be systematically carried out, and stringent measures are now being taken by the Manila board of health in the matter.

Orders directing bodily inspection of all enlisted men at regular intervals have been issued, with the intention of detecting all diseased soldiers and treating them at a special hospital. Los Banos, on Laguna de Bay, possessing hot springs closely resembling, in the composition of the water, the hot springs of Arkansas, has been selected as a suitable place for the treatment of syphilities, and a small number are now there undergoing treatment. Maj. J. C. Minor, surgeon, United States Volunteers, who is in charge, and who practiced at Hot Springs, Ark., for years, says: "The water is apparently unlike all other natural hot waters except that of the hot springs of Arkansas, in that to the senses it is essentially a pure, sparkling, palatable, and highly assimilable hot water. Should the analysis show no great quantity of mineral, there is little doubt but that its therapeutic value as an emunctory stimulant will equal or excel that of Hot Springs, Ark."

The main well has an apparent discharge of 3,600 gallons per hour of water of the temperature of 212° F.

Several buildings, some antiquated tubs, 3 large tanks, and 3 vapor closets are on the spot, relics of the Spaniards' hospital. There are no water connections or sewerage, and much repairing, plumbing, etc., will be necessary. The details of the whole plan are being as rapidly as possible carried out.

It is too soon to give, as yet, the results of treatment by the waters.

MORTALITY.

It is gratifying to report a steady decrease in deaths.

This seems to be mainly due to the falling off in the number of those killed in action and died of wounds, but the figures showing deaths from disease give a decrease in some important particulars, and at least a maintenance of former rates in all others except dysentery.

It was expected that the death rate from disease would increase with the length of service of troops on the islands. That this has not done so on the whole for the last nine months is very satisfactory.

The following summary gives total mortality from August 1, 1900, to April 30, 1901, and the percentages of last report are added for comparison:

Cause of death.	Officers.	Enlisted men.	Per cent of total mortality.	Per cent last report.
Killed in action	13	252	0.1673	0.2090
Died of wounds	1	23	.0243	.0462
Injuries	4	50	.0547	.0273
Suicide		21	.0212	.0201
Drowned	1	58	.0597	.0402
Variola		34	.0346	.0894
Typhoid fever	2	65	.0679	.0814
Dysentery	2	241	.2462	.1980
Malaria		49	.0497	
Other diseases	8	263	.2745	.2884

An average of 3.6 deaths daily as compared 4.7 of last report.

The mortality rate for the period is about 20.45 per 1,000 per annum; in the last report it was 26.7 per 1,000 per annum.

There are some especially noticeable features in the above table.

The proportion of officers killed in action is very great.

Deaths from wounds received have diminished nearly one-half from last year.

This indicates that in the exigencies of the active work of recent months, the greater facilities in personnel of medical officers and hospital corps have allowed of better and more prompt attention to the wounded.

Dysentery gives a large increase, and this bears out the belief that every case of amœbic dysentery should be sent home at once, when the diagnosis is made. It would also appear that length of service does not give any immunity from dysentery, but rather seems to predispose to its acquirement.

Suicides remain at nearly the same ratio.

The mortality for variola has decreased 60 per cent of former rate. In typhoid fever it has diminished 28 per cent.

Malarial fever and results give a very small mortality, notwithstanding their great prevalence. It is commonly observed in the provinces that the natives have "Calentura" as severely as American soldiers, and with a considerable mortality. As outpost duty diminishes and the men can sleep in their cots with mosquito bars every night, malaria will probably diminish very much.

TRANSFER OF INVALIDS TO UNITED STATES.

This constant and unavoidable drain on the strength of our forces remains large, and although the greatest care to choose the subject for transfer has been taken, and each patient is carefully examined by a board of medical officers, the figures show that the loss from transfer for treatment to the United States will be a very large factor in estimating the strength of troops to be kept or afterwards sent for duty in the Philippines.

It has been found poor economy in many cases to keep a soldier here who has apparently recovered from an attack of dysentery and has been returned to duty from hospital, with hardly an exception again to be taken sick. The amount of duty performed by a sick man between his stays in hospital is entirely incommensurate with the ultimate danger to his health or life. It is best to send such a case to the United States as soon as the disease is diagnosticated.

Patients with tuberculosis should not stay in the Philippines.

Malarial fever is generally completely recovered from. Nearly all of the well men of a year's service or more have had it, but men saturated with the malarial poison from service in especially unhealthy localities, bloodless and weak, with torpid livers and enlarged spleens, never completely recover here and should be sent home. Such patients furnish fertile soil for dysentery. Experience shows that a lowering of the physical standard for recruits is an expensive luxury, when such men are sent to the Philippines. More especially does this apply to the enlistment of minors. Even a strong, athletic youth, with the measurements of a man of 21, and free from blemish, is seldom a desirable recruit for tropical service. In September I noted that out of 445 convalescents to be sent to the United States for treatment, 129 were under 21, or 29 per cent of the whole number. Such boys are particularly prone to typhoid fever; in fact, 18 or 19 is the favorite age for typhoid fever all the world over. They seem to have malarial fever more severely and become cachectic more rapidly than older men. When the first sense of novelty and adventure wears off the boys lose heart and become homesick; in short, they are more imprudent concerning their own health and less resistant to the disease-producing agents.

An ideal army for the Tropics would consist of men between 25 and 40 years of age.

From August 1 to April 30 the number of invalids sent home for treatment was as follows: Regulars, 1,132; volunteers, 2,861.

These figures are very misleading in the case of volunteers.

The rate sent home for regulars has increased over my former report by just about enough to be accounted for by the lengthened stay of the regular troops in the islands.

In the volunteers, as the time of their muster out drew nearer, it was foreseen that transportation here would be insufficient for all the sick toward the last, and orders were issued to send in to Manila all sick volunteers, even those in regimental hospitals, for transfer to the United States. Many of these cases were trifling and no doubt recovered before a week out of harbor had passed.

The rate of men of the volunteers who should have been sent home under any circumstances, because of imperative need to save life or restore health, would not differ greatly from that for regulars.

The system inaugurated February 25, 1900, of sending men recommended for discharge on surgeon's certificate of disability to Hospital No. 3 for observation has worked satisfactorily. Malingering is detected and the papers are properly completed before the men leave for final discharge at San Francisco. Maj. John S. Kulp, surgeon, United States Volunteers, has supervised this important work.

From May 31, 1900, to April 27, 1901, including 46 men in Hospital No. 3 at the latter date awaiting transfer, there were sent home 526, as follows:

Disability contracted after enlistment in line of duty	380
Disability contracted after enlistment not in line of duty	43
Disability self-inflicted after enlistment in line of duty	10
Disability self-inflicted after enlistment not in line of duty	5
Disability contracted prior to enlistment not in line of duty	88
Total recommended for discharge	526

Cases classified.

Circulatory system	34
Nervous system	60
Digestive system	32
Respiratory system	16
Muscular system	5
Ocular	36
Nasal	1
Aural	35
Venereal	36
Congenital	6
Gunshot wounds	118
Injuries	147
Total	526

This is a large number to lose in less than a year's time, but every care has been taken to select cases for discharge, and it is not likely that the figures will be improved upon as new troops come in.

Of insane soldiers, 121 have been sent home since August 1; of these, 72 were regulars and 49 volunteers. These cases are of melancholia and simple acute mania, and the causes are to be looked for in the general conditions surrounding soldiers' life in the Philippines acting on predisposed men.

It is believed that nearly all are of a temporary nature, and are cured by return to their homes, but I have no reliable statistics on this head, and can not speak with certainty.

Contrary to general belief in the United States, there is not much disability from alcoholism. The habits of the enlisted men differ but little from those in the United States. An exciting cause of a certain proportion of the insanity, as well as the origin of a large part of the drunkenness in the provinces, is the use of the so-called "vino" of the natives, a crudely distilled alcohol, causing very rapid intoxication, which is rather easily recovered from without suffering when a moderate amount is taken. In great excess it causes wild delirium, unconsciousness, and sometimes death, and in habitual users a deterioration of the mental faculties, delusions of persecution, attempted suicide, and aphasia have been observed.

HOSPITALS.

All of the Manila hospitals have been in use during the period covered by this report, and no one could have been dispensed with. In January and February the accumulated sick of the volunteer regiments were collected in Manila and sent home prior to departure of their regiments. I then decreased the bed capacity of the Manila hospitals one-third, and still further decreased the quota of medical officers at the hospitals. As the movement of the sick homeward came abruptly to an end, owing to lack of room on transports, and other sick began to accumulate, I was compelled again to increase the bed capacity of these hospitals. There seems no probability in the near future that any one of these hospitals can be discontinued. They are all modern in equipment, as well as are the departmental hospitals, some of which compare in equipment and size with the hospitals in the city. The regimental hospitals, of varying capacity, have fulfilled their purpose as emergency hospitals, and most cases of ordinary severity are now treated throughout with the regiment. Some of these compare very favorably with the old one and two company post hospitals in the western United States; many are merely extemporized, and as their usefulness depends on their being available for a large part of the regiment, it sometimes happens a newly repaired, neat, and quite complete regimental hospital is rendered

nearly useless by the still further breaking up of troops into small detachments, and a post of three or four companies drops to a garrison of thirty men or so.

It is manifestly impossible to establish anything of the nature of a complete post hospital at every station occupied by troops. The present arrangement is sufficient for present needs.

When the locations for permanent garrisons are finally chosen, on the establishment of peace, the regimental hospital will be a thing of the past.

Under existing regulations the management of the subsistence of hospitals is a constant source of embarrassment and worry. Three distinct messes must be run, exclusive of the private mess of the officers, viz, patients, hospital corps, and nurses. The patients must be still further divided into two classes—those drawing regular rations and those sick enough to use the 40 cents per day allowance. While this, with infinite trouble, can be and is done at the large hospitals, it is utterly impracticable at the small. There is inevitable mixing of the two rations, and endless opportunity for the misuse of the special allowance for the sick. The remedy to my mind is simple—to reduce the allowance to 30 cents per day and allow the sick, nurses, and the Hospital Corps to subsist upon it. I believe this would result in a real saving to the United States. The argument that men of the Hospital Corps would thus receive a better and more costly ration than enlisted men of the line is met by the well-known facts that small squads can not make savings in anything like the proportion that company messes can, and that any saving under this allowance would revert to the commissary department.

The Emergency Hospital, established July 25, 1900, for the purpose of extending emergency treatment to any person in Manila needing it, has been in satisfactory operation, under the charge of Maj. W. F. Lewis, surgeon, United States Volunteers, and is doing much to relieve suffering and expedite the prompt treatment of both injuries and disease.

In addition to emergency work proper the hospital receives all patients among soldiers, citizens, and employees arriving in Manila by inter-island boats, and attends to their transportation to the proper hospitals. A daily sick call is held, and Government employees, including metropolitan police, are treated. A hospital steward and four privates of the Hospital Corps are on duty, with one ambulance, and every telephonic call day or night is answered. From July 25, 1900, to April 24, 1901, 2,385 cases were entered on the record, divided as follows:

Regular troops	384	Volunteer troops	536
Employees:		Civilians:	
American	538	White	209
Filipinos	273	Filipinos	241
Chinese	71	Chinese, etc	33

In response to a cablegram from the Adjutant-General of the Army to the commanding general of the Division of the Philippines, the full equipment of a 100-bed hospital was shipped to Nagasaki on the U. S. Army transport *Sheridan* in January. A sufficient personnel of officers and Hospital Corps accompanied, with Capt. I. W. Rand, assistant surgeon, United States Army, in command. As no instructions were received from Washington regarding the future use of this hospital, it is assumed that its establishment is for the purpose of caring for the sick and wounded on passing transports who are too ill to proceed farther on the journey to or from the United States.

The work of the new army pathological laboratory has proved of incalculable value in clearing up doubtful diagnoses, and in putting the study of the diseases of the Philippines on a scientific basis, and indicating lines of treatment best calculated to cure. It has been in sole charge of First Lieut. R. P. Strong, assistant surgeon, United States Army, who, as president of the board for the investigation of tropical diseases, prepared, at my direction, and issued in February the first number of a series of circulars on tropical diseases.

The primary object of this series of circulars is to furnish physicians arriving in the Philippines with a summary of the diseases to be found here.

The first circular dealt with animal parasites found in the human intestines in the Philippines; the second with dysentery, both amœbic and infectious, and the third with bubonic plague, by First Lieut. William J. Calvert, assistant surgeon, United States Army, a member of the Manila board of health.

SANITATION.

Greater interest is taken and more intelligently by both officers and enlisted men in the work of sanitation, notwithstanding that the prevailing diseases keep at about a constant rate without much change from last year.

Less than two years ago the volunteer regiments were raised in the United States, of men ignorant of the first principles of military service; now they are all either already mustered out of service or on their way home for that purpose. After promptly losing their immature, dissipated, and imprudent members in the first few months of their service here, these regiments, prior to leaving the Philippines, were about as healthy and physically efficient a lot of men as could possibly be expected after a year and a half of service in the Tropics. The experienced soldier instinctively observes most of the cardinal rules of personal and local hygiene. It has been ceaselessly reiterated to him that he must carry out certain simple and well-defined hygienic regulations or else sickness and death would follow. The proposition was treated by him at first with all the notorious indifference of healthy men to such advice, but it was not long before its truth was only too well demonstrated by the loss of his comrades, or perhaps his own severe illness, and soon the advantages of living with sanitary surroundings, of drinking pure water, and sleeping under mosquito bars were appreciated by him. When this appreciation once is possessed by the enlisted man he is about as much of a practical sanitarian as we may expect to find him, and even so much he only learns in months or years, a space of time inversely proportional to the severity of his experience.

The use of absolutely pure water is probably of more importance in this country than the observance of all other rules of sanitation combined; and as typhoid fever, dysentery, and the presence of innumerable intestinal parasites originate almost entirely from drinking bad water, it would seem we should in great part eliminate them from our list of diseases.

Circulars and orders have been issued repeatedly, requiring commanding and company officers to use every effort to provide a supply of pure water for their commands, and the monthly sanitary reports show that this is done at all stations in the archipelago. The Waterhouse-Forbes sterilizer is in operation throughout the islands and gives satisfaction, although care in its management must be taken to insure that the water passing through is sterilized. The necessities of field service often require troops to drink bad water, and when men visit Manila they seldom get other than that drawn from the city mains, which is by no means above suspicion. Very few of the hotels, boarding houses, and saloons of Manila provide sterilized water for their guests. Impure water is often used by the natives in the making of ice cream, lemonades, and other soft drinks, which they sell to the troops. A certain percentage of water-borne disease is probably acquired this way; also by the use of badly washed green garden produce. With new troops coming here the utmost vigilance on the part of medical officers is required to keep the sanitary condition even up to its present standard. New men must be broken in and acclimated, and the medical officers must strain every nerve to minimize the inevitable object lessons of death and disease before this is accomplished. Daily sanitary inspections by medical and company officers, of hospitals and barracks; weekly, of the command, by company commanders; and monthly, with reports, by surgeons, should suffice to keep a garrison in good condition.

The inspections by district chief surgeons are of great value, as they have opportunities for comparisons which enable them to give useful advice to officers under them. To superintend the entire system, and to make special inspections himself when the importance of the occasion requires it, the services of an experienced and capable medical officer, with the legal status of an inspector, and not merely detailed for duty, are imperatively needed; he should have the inherent authority of an inspector-general in his own field, and it is earnestly hoped that necessary legislative action on this point will be taken. During the period covered by this report, Maj. L. M. Maus, surgeon, United States Army, performed much valuable work in this direction, including a visit to Benguet Province, in Northern Luzon, to report upon its suitability for a great sanitarium, where soldiers invalid from tropical service in other parts of the islands might be restored to health, and where whole organizations who have served in malarious and unhealthy localities might be stationed for duty. The climate seems to be an ideal one for troops to serve in and keep in good health, but besides the fact that there might be insuperable difficulties in so managing the changing of the troops in the division that all could get sufficient service in this favored district, and at the time they might most need it, it seems to me that invalid soldiers need a more radical change than can be obtained in the archipelago, and that men worn-out by constant and repeated attacks of sickness in the Tropics require a year or two at least in their own country before being again fit for duty here.

The great expense which would be incurred in establishing and maintaining a sanitarium in Benguet, with its inaccessible location, requires caution to be exercised in this matter. The results of troops actually camping in Benguet should first be known, as to their physical condition and the presence or absence of usual tropical diseases.

TRANSPORTATION.

The transportation of over 4,000 invalids, insane, and men to be discharged on surgeon's certificate of disability, to San Francisco has been successfully carried out, and, from what I can unofficially gather, great improvement has taken place in the condition of the large majority. Deaths have occurred from dysentery and other diseases, but on many occasions, after careful deliberation, and on the urgent prayers of the patient, men were sent as a last hope. It is unfortunate that I have not in my possession official statistics concerning the health, recoveries, and mortality of invalids on transports to the United States.

For inter-island transportation of sick to Manila, the hospital ship *Relief* has been the main reliance of the Medical Department. She has been used for the double object of collecting the sick from remote stations for transport to Manila, and more recently for the purpose of giving the benefits of a sea voyage to invalids in Manila who were seemingly not improving in the hospitals. Incidentally, the *Relief* has distributed much-needed supplies to remote stations.

The first consignment of invalids to be given the benefits of a sea voyage on the *Relief* left Manila March 21, and consisted of 140 patients.

Many of these had been on sick report for weeks at the different hospitals. The change of air and food, the interest of the voyage, and the cool nights had a most decided effect for good; 29 were entirely well and 100 much benefited. Major Perley, commanding the *Relief*, was so much struck with the result that he recommended on future voyages of the *Relief* that 150 convalescents should be sent for the benefits of the sea trip.

On April 16, 180 selected patients from Manila hospitals were given this opportunity. The results were equally beneficial, and Major Perley reached the conclusion that cases of dysentery, malarial, and typhoid convalescents do particularly well, but that tuberculosis does not improve and should not be sent.

Short outings in the launch *New York* are given every day for two hours to the sick in Manila hospitals able to stand the little journeys. These are of real benefit to the convalescent sick and give the greatest pleasure, which is evinced by the eagerness of the patients to be allowed to go.

After trying in vain to find in these waters a vessel of light draft, suitable for a hospital ship, and able to enter the shallow harbors and go up the rivers of the archipelago, for the purchase of which authority was received from the War Department, I finally requested that the vessel be bought and fitted out in the United States and sent here.

Three vessels were pronounced by the Medical Department as fitted for this purpose, but all were rejected by the Quartermaster's Department on account of excessive price, or unsuitable machinery requiring expensive alterations. There will always be need of such a vessel, and it is hoped that final action will not be long delayed.

BOARD OF HEALTH OF MANILA.

The board of health of the city of Manila is composed of six active members, all medical officers of the Army, and two honorary members from the medical profession of Manila.

In a report made to the provost-marshal-general, covering the period from July 1, 1900, to April 30, 1901, Maj. Franklin A. Meacham, surgeon, United States Volunteers, president of the board, gives concisely a most interesting history of the operations of his department. The work done was enormous in amount and was performed with a thoroughness and attention to detail deserving the highest praise.

Maj. Guy L. Edie, surgeon, United States Volunteers, was president of the board until December 12, 1900, when he was ordered to the United States and Major Meacham detailed in his place.

The important work of taking a census of the inhabitants of Manila was begun on January 1, and ended in April. It was made under the personal supervision of, and practically by, First Lieut. Harry L. Gilchrist, assistant surgeon, United States Army, chief of the sanitary division, board of health, and is believed to be the first accurate census of the city of Manila.

The total population of the city of Manila, exclusive of officers and men of the Army and Navy, was found to be 244,732, divided as follows:

Americans	8,461
Filipinos	181,361
Chinese	51,567
Spaniards	2,382
Other nationalities	961
Total	244,732

In connection with the census a complete sanitary map of the city was prepared, "on which was checked every house, hut, and outhouse; separate sanitary plans were made also for each premises, with population by age, sex, and nationality."

During the period of ten months covered by Major Meacham's report the total number of births registered in Manila was 3,349, or 18.29 per 1,000. Many births occurred without medical attendance and were not certified to by anyone. This rate is therefore incomplete and unreliable.

The number of deaths, including stillbirths, was 8,671, an annual rate of 42.54 per 1,000, exclusive of Army and Navy. Twelve cemeteries and 1 crematory are in charge of the board of health.

Burial permits are required and certificates of deaths, when not furnished by attending surgeons, are made by municipal physicians after examination of the dead body. A careful check is kept on the permits and cemetery reports. Mistakes are investigated and are very rare.

No disinterment can be made without a permit by the board. An inspector is present at each, and the body must be placed in a hermetically sealed casket.

A system of regular house-to-house inspection is carried on irrespective of special and extra work in epidemics. The city is divided into 10 districts for this purpose, and the available force consists of 1 medical officer (member of board), 1 interpreter, 1 chief inspector, 10 district inspectors, 30 subdistrict inspectors, 60 inspectors.

Ten of these are Chinese and the rest Filipinos. Every house must be inspected at least weekly. Contagious disease is searched for, rat poison is distributed, and disinfection performed when necessary. A sanitary card is posted on each house, on which is noted the condition found by the inspector, with the date of visit. The work of the inspector is thus checked by the chief and district inspectors.

The people evince a most gratifying willingness to accept the sanitary instructions of the board of health, and Major Meacham reports that the sanitary condition of the city is excellent, as far as the inhabitants can make it so, and that the many unhygienic conditions remaining can only be remedied by the municipality and by the expenditure of much money.

Improvements most urgently needed are (1) a system of drainage and sewerage; (2) dredging and cleaning moats and canals; (3) a water supply, pure and ample.

Four hundred and thirteen licenses were acted on, involving physicians, pharmacists and dentists, the sale of food and drink, offensive trades and lodging houses, of which 310 were approved.

The board of health has had to contend with the following infectious or contagious diseases: Bubonic plague, smallpox, tetanus, typhoid fever, tuberculosis, whooping cough, measles, mumps, beri-beri.

Compulsory notification is required of each case of the above diseases except beriberi and tuberculosis.

Cholera has fortunately not gained an entrance, though present at Singapore and on shipboard at Hongkong.

Bubonic plague is dealt with in the most stringent manner. Two hundred and fifty-four cases with 199 deaths have occurred:

	Cases.	Deaths.
Chinese	166	135
Filipinos	86	62
Spanish	1	1
American	1	0

The following method of dealing with the plague is in use: Medical officers, usually acting assistant surgeons awaiting transportation to the United States and temporarily reporting to the board for duty, are stationed in the infected districts, each having an office with telephonic connection with the board office. Every case of illness and every death in the district is reported to them, and they visit each case and inspect the dead. When necessary, they send the patient or body to the general plague hospital or the Chinese plague hospital, in ambulances used only for this purpose, and summon a disinfecting cart at the same time. An inspector accompanies each patient or corpse to its destination; another takes charge of the house until the disinfecting cart arrives; the floors are wet down with 5 per cent carbolic acid; all clothing and articles which have been in contact with the infected person, and everything not easily disinfected, are burnt in the street; other articles are sent to the steam disinfector. The house is systematically treated with carbolic solution, which is thrown into all crevices by a force pump; all occupants of the house take a disinfectant bath, and exposed persons are sent to the detention pavilions. The house

owner is compelled to make such alterations and repairs as may be needed, and the house is placarded and visited daily until twelve days have passed. The disinfecting carts are specially constructed and have a metal-lined compartment for articles to be sterilized, besides room for apparatus, etc. Bodies are removed in metallic caskets, to be burned or buried in quicklime. Inspectors are on duty day and night.

Experience shows the infected districts to be about the same as last year. A system of depopulation is being actually carried on. Infected houses and unsanitary hovels in their neighborhood are attacked and cubicles and partitions are removed; outhouses and structures built in yards and unfit for human habitation are destroyed, letting in sun and air; sewers and drains are flushed by the fire department under supervision of the board; all evicted people are given shelter in tents until they can find dwelling places.

These measures will have to be carried on unremittingly, but the very extensive municipal sanitary improvements already mentioned must be accomplished before Manila can be considered a healthy city.

Every precaution is taken to prevent the spread of plague from Manila to the provinces; all passengers leaving by ferries and inter-island boats are inspected in conjunction with the Marine-Hospital Service, and a medical officer inspects all passengers leaving by train.

Smallpox in Manila has been very mild, with 101 cases and only 2 deaths. Shortly after the American occupation the newly appointed board of health began to institute thorough vaccination, principally among the children. This year the majority of cases are adults; vaccination and revaccination are being effectively carried on; 22,590 children and 43,128 adults have received it during the period.

The Vaccine Institute manufactures reliable virus, and 899,900 units were prepared from 57 young caraboa calves in the form of glycerinated lymph. The amount was distributed throughout the archipelago.

The system of house-to-house inspection has revealed a good many cases of leprosy. There are now 159 lepers under treatment in Manila and 27 died during the period. The report of the board to select a suitable island for the segregation of lepers was made and is now in the hands of the civil commission. Until the plan to form such a settlement for the segregation of all lepers in the archipelago is carried out the treatment of the leper will be unsatisfactory and the extermination of the disease impossible.

Measles, mumps, and whooping cough are not common, and are of a mild nature. Mumps has often been confounded at the outset with plague. First Lieut. W. J. Calvert is in charge of the bacteriological laboratory of the municipality. This has only been recently fully equipped, but has done much and varied work on urine, faeces, sputum, and blood for the practitioners of Manila. Glanders has been detected in horses and trichina in hogs. Most of the work in the laboratory has been on plague, and 160 blood examinations have been made. The plague organism, its effect on animals, and the pathological changes caused in them have been studied and form the foundation of Lieutenant Calvert's pamphlet on plague, the third of the series of circulars on tropical diseases issued. Cultures of plague from Tokyo and Hongkong have been compared with cultures from Manila.

Work on antiplague, antityphoid, and antitetanus serum has been carried on at the farm in the grounds of the San Lazaro Hospital.

Rinderpest, which is prevalent among the cattle of the Philippines and bears directly, of course, on the public health by affecting the meat and milk supply of the people, is being studied here also. An immunizing serum is being tried, and results are promising. A circular on this disease was issued in English and Spanish, with differential diagnosis from foot-and-mouth disease.

Four hundred and twenty-six blood examinations have been made on native prisoners of war in search of filaria, but only two positive cases were found.

Repeated bacteriological examinations of the water supply of Manila, of the Mariquina River and Laguna de Bay have also been made in the laboratory as a preparation for the contemplated work of providing the city with a pure and ample water supply. A series of water examinations and tests of the purity of the ice manufactured in the city are, independently of the board of health, being made by Maj. Charles B. Ewing, surgeon, United States Army, at the Santa Mesa Hospital.

Chemical analysis of the city water has also been made by the city chemist. The examinations so far are not conclusive, but go to show that the Mariquina River above Montalban possesses marked advantages over the Laguna as a future source of Manila water supply.

The board of health has prepared 16 important municipal ordinances bearing on public health, and submitted them to the board appointed to consider city regulations and ordinances.

The forthcoming annual report of the board will be a full and detailed statement of all its operations for the fiscal year, with tables, maps, and pictures. The operations of the Manila board of health indicate in a perfected form the important public sanitary work which is being done throughout the islands by medical officers of the Army. Every city has its health officer and every little inland town where troops are stationed has its sanitary condition, more or less supervised by the medical officer.

HEALTH OF PRISONERS OF WAR.

A large number of prisoners were held in Manila during the last few months, and it was found necessary to engage native physicians to treat them. The general supervision of their health and the sanitary condition of the prisons is intrusted to the chief surgeon of the separate brigade, provost guard.

Beri-beri prevails quite extensively among the prisoners, and those in the early stages of the disease were, on the recommendation of the chief surgeon, released and discharged, when practicable. The patients were isolated in tents, and every attention paid to hygienic conditions. As the ration for native prisoners was not considered suitable for the disease, it was promptly improved, and in the case of the sick the money value was authorized to be expended for articles deemed necessary for their diet, and a marked improvement was then noted.

Accurate statistics are not at hand for the total period, but between March 10 and April 10, 1901, the total number of prisoners of war was 4,149; total sick, 1,339 (of beri-beri, 697); deaths—beri-beri, 45, other causes, 50. Fifty per cent of all sickness is beri-beri. On April 12 the improved ration was introduced and now there is a great reduction in new cases and many recoveries, 23 having been returned to duty in one day.

MEDICAL PERSONNEL.

At the date of my last report, July 31, 1900, there were 375 posts where garrisons were stationed. To-day there are 479, an increase of 104, counting Manila as a garrison, although troops are located at 23 separate stations in the city.

Although the number of garrisoned posts has increased and the work of the department, outside of the direct care of the health and lives of the officers and men, has become more comprehensive and is still reaching out in many directions, the number of medical officers, allowing for inevitable loss by termination of contract and muster out of volunteers, has not increased proportionately. Even should there be a decided reduction in the total strength of the army in the archipelago, so long as many an scattered towns and barrios are occupied by the army, so long will there be a necessity for a number of medical officers, much larger than is generally deemed sufficient for troops concentrated in regiments or battalions.

On May 15, the total strength of medical officers in the division was 491, nonavailable 68, leaving 423 available. The following table gives their assignments:

Available officers.

Chief surgeons and assistants (of division, departments and districts)	20
Hospitals	67
Supply	5
With troops	331
Total	423

Nonavailable.

Board of health	7
Board on tropical diseases	2
Attending surgeon	1
Detached service (United States)	8
Sick	11
On transports	2
Foreign service	7
On leave	4
Under orders to return to United States	26
Total	68

It will be seen that, deducting the necessary officers for administrative supply, large hospitals, etc., there are 331 medical officers to care for the troops at 479 separate stations.

The allowance for Manila and base hospitals, board of health, and administration is kept to the lowest limit consistent with the actual efficiency of the office or institution.

I have already expressed the opinion that the proper ratio of medical officers is six-tenths of 1 per cent of the aggregate strength of the Army, to which should be added for service here one-tenth of 1 per cent for emergency. In my last report I stated that a force of 500 medical officers was necessary to properly care for the number of troops then in the Philippines. The present aggregate strength is less than at that time, but much more scattered, and unless a decided reduction in the number of separate stations takes place in the near future, the prospect is that the department will be again seriously crippled for want of medical officers.

In these islands the Medical Department is charged with a duty far beyond the care of the health of the military forces. It is doing now and must continue to do work connected with public sanitation which is never demanded of it in the United States. In Manila the bubonic plague is being fought night and day, lest it become epidemic, and there is always the possibility of cholera entering Manila from some of the infected ports in Asia. A reserve force of medical officers beyond what is actually needed to care for the troops is required.

A reduction of the military strength without a concentration of troops will not materially relieve the situation. It is the distance between posts and not the numerical strength that should be counted. A soldier at a station of 30 men is just as liable to need medical or surgical aid as at a regimental post, and is just as much entitled to it. If he can not promptly obtain treatment from a neighboring station, a medical officer should be stationed with the detachment at the 30-man post.

Assuming a continuance of the present conditions, I still deem 500 medical officers necessary.

There is no fear that a large excess of officers will, under any conditions, be present in the Philippines, as chief surgeons of departments have orders to report all surplus surgeons for annulment of contracts.

Just now the plague in Manila is at its seasonal height, and with a view of utilizing the services of contract surgeons in Manila awaiting transportation home, I have directed them to report to the president of the board of health for duty as sanitary inspectors.

The army medical examining board has been in session in Manila since April 28, 1900, and has examined 150 candidates for the Medical Corps, United States Army. Of these, 44 have passed successfully and 25 are already commissioned and 19 approved candidates remain. The candidates were entirely from medical officers of volunteers and acting assistant surgeons, United States Army.

The medical officers in this division have, as a rule, been zealous and efficient in performing their duties, responding promptly when called upon for extra services, which they rendered cheerfully and without complaint.

The sanitary work, both in its military and civilian aspect, has been exceptionally good, and the vigilance of medical officers in this respect has been an important factor in securing the comparative freedom of the army from the ravages of tropical and infectious diseases.

The following medical officers were killed in action or died from disease while in the performance of their duty:

Killed in action.—Acting Asst. Surg. F. W. Hulseberg, United States Army, killed August 1, 1900, in engagement at Majayjay, Laguna, Luzon, P. I.; Acting Asst. Surg. C. B. Ross, United States Army, killed February 2, 1901, between Tayum and Bucay, Abra, Luzon, P. I.

Died from disease.—Maj. W. R. Hall, surgeon, United States Army; Maj. J. C. Davis, surgeon, United States Volunteers; First Lieut. L. P. Smith, assistant surgeon, United States Army; First Lieut. S. M. Stuart, assistant surgeon, United States Volunteers; Acting Asst. Surg. J. A. Rabbett, United States Army; Acting Asst. Surg. S. A. Yule, United States Army.

MEDICAL SUPPLIES.

Medical supplies are now sufficient for the needs of the division, and there is little complaint as to quality.

Every care is taken to check expenditure, and district surgeons are instructed to keep a vigilant eye on the use of medicines at their posts when inspecting.

The standard supply table in use in the United States authorizes an allowance of many

medicines entirely inadequate to the actual need of troops in the Tropics. Broadly speaking, in remedies used for malarial and intestinal complaints, tonics, restoratives, dressings, and topical applications for skin diseases, ulcers, boils, and slight injuries, the expenditure is relatively very large. Men doing duty are at all times more or less under treatment, if for nothing else than a patch of dhobie itch, or an inflamed abrasion from a new shoe. Whole companies in specially malarious localities are taking quinine prophylactically. Strychnia and iron are used daily by scores of men not on sick report. The dividing of the troops into many small detachments and the necessary supply of simple remedies to small scouting parties cause an unavoidable wastage. Of late there has not been much loss in transit of medical supplies.

A supply table for use in the Philippines, calculated on a six months' basis, and making due allowance for local needs, is in the hands of chief surgeons and seems to be a satisfactory guide for medical officers passing upon requisitions.

It was found necessary, in the interest of economy, to establish supply depots in each department, besides the general depot for the division. Subdepots, under charge of chief surgeons of districts, are also in operation at Vigan, Aparri, Calamba, Nueva Caceres, Cebu, and Cagayan. This plan works satisfactorily and prevents delay and loss, which would inevitably occur with only one central supply depot.

Ice machines are in operation at 17 points, and prove of inestimable value in the treatment of the sick and the comfort and health of the troops. There has been much complaint on account of alleged inferior workmanship in some of these machines, causing constant breakdowns and great trouble and expense in repairs. The output of ice seems also not always to be what is claimed for the machine. Extra strong apparatus is required for use here, as energy is expended in lowering the tepid water supplied to the freezing point.

HOSPITAL CORPS.

The following is the numerical status of the hospital corps of the division:

On duty August 1, 1900	2,356
Gained:	
From United States	798
Transferred from line	4
From desertion	1
Enlisted and reenlisted	23
Appointed hospital stewards from United States Volunteers	8
Total gains	834
Loss:	
Transferred to United States	443
Discharged	108
Died	24
Deserted	9
Transferred to line	1
Total loss	585
On duty April 30, 1901	2,605

Under present circumstances I deem a 5 per cent allowance of Hospital Corps to the aggregate strength of the command to be necessary in the proportion of one hospital steward, or acting hospital steward, to each five privates of the corps.

A diminution of the force in the Philippines, and especially a concentration at central points, will allow a great reduction in this estimate.

Noncommissioned officers and privates have performed duties calling for good judgment, knowledge, and self-reliance, often in the absence of medical officers. Some of them have profited by their experience in tropical diseases to such an extent that confidence can be placed in their ability to recognize the severity of symptoms in a given case, and to give due notice to neighboring surgeons. When several separate posts are under the care of one surgeon this is a valuable acquirement.

It is gratifying to note that officers and enlisted men of the line as a rule appreciate and commend the work of the hospital corps man. Dangers and hardships have been shared by each equally. The members of the Hospital Corps have done their duty faithfully and fearlessly.

The school of instruction for the hospital corps at hospital No. 3 has graduated three classes in sessions of 14 weeks each; total number of scholars 137, of whom 50 received diplomas. The fourth class, now undergoing instruction, consists of 60

men. The interest taken and results accomplished more than justify the establishment of the school.

Instruction of a practical kind has been given detachments of the Hospital Corps at all stations. There are so many small posts with only one or two privates of the corps that litter drill has, as a rule, been impracticable. With very few exceptions the men have seen field service and understand the use of dressings and the handling of wounded. Too much of this kind of instruction can not be given. In my opinion drill with the ambulance and litter, according to any kind of prescribed manual, is time largely wasted. Instruction at centrally located schools, followed by service with troops in the field and garrison, and the grading of privates in two or three classes, according to efficiency and nature of duties, should give us a personnel of the highest attainable efficiency. I have already expressed my views at length on this subject in two letters to the Surgeon-General.

The following members of the Hospital Corps have performed such special services as entitle them to particular mention: Hosp. Steward E. C. Baldwin, for distinguished service in action; Private William H. Phelps, Hospital Corps, for distinguished service in action at Manicle, P. I.; Private Michael Hitz, Hospital Corps, for distinguished service in action at Maranduque, P. I.

The army nurse corps, finally put on a permanent basis by recent legislation, had 107 members on duty April 30, 1901, at the larger hospitals, and performed efficient and faithful service. In addition to these, seven male contract nurses are still in service.

REPORT OF MAJ. V. HAVARD, SURGEON, UNITED STATES ARMY, CHIEF SURGEON, DEPARTMENT OF CUBA, JULY 22, 1901.

I have the honor to submit the following report of the operations of this office for the fiscal year ending June 30, 1901:

The health of the troops in Cuba during the year has been very good, showing a marked and steady improvement upon former years. Thus, while during the year ending June 30, 1900, the admissions to the sick report were 322 per cent, with 1.51 per cent of deaths, the admissions during the past year are only 193 per cent, with 1.25 per cent of deaths. Comparing the results obtained in the appended table for the island of Cuba with the statistics in the last report of the Surgeon-General (calendar year 1899), we find that our ratio of admissions is less than that for all troops outside the United States (252), but more than that for troops stationed in the United States (168). In like manner, our ratio of deaths is less than that for all islands (2.55), but more than that for the United States (0.79). Our mortality was largely increased by outbreaks of yellow fever, a disease not likely again to occur among troops in Cuba, except possibly in a scattering, sporadic manner. If we deduct the number of yellow-fever cases from the total mortality we obtain a percentage of 0.80, practically that of the United States.

Further comparison furnishes instructive details. In Cuba the ratio of admissions for diarrheal diseases, dysentery, malarial fevers, and yellow fever, as should be expected, is higher than in the United States, but that of the common infectious diseases, such as scarlet fever, measles, smallpox, influenza, mumps, diphtheria, is very much lower, the majority of cases under the heading of "Other infectious diseases" in our tables being vaccinia; that is, the condition produced by vaccination. There was not a single case of smallpox during the year. The ratio of typhoid fever is about one-third that of the United States, and much greater in western Cuba, where are the large seaport towns, than in the eastern part of the island. Strangely enough, tuberculosis among our troops is more common in Cuba than in the United States, as 0.44 to 0.32, and about the same as in all the islands (0.45), which is remarkable, in view of the fact that other diseases of the respiratory system, such as bronchitis and pneumonia, are almost unknown. This relative frequency of tuberculosis among soldiers in Cuba, and its great prevalence among civilians, would tend to show that a rather high and equable temperature all the year round is not by itself a factor of great importance in the prevention and cure of that disease.

Our record for syphilis and other venereal diseases is bad, being nearly double that of the United States, and apparently also worse than that of all the islands. This evil has always been one of the troublesome problems to confront surgeons in Cuba, and there is no satisfactory solution in sight. About one-eighth on the sick report are victims of it. Were it possible to examine all prostitutes and subject them to treatment when necessary, these diseases would be much less prevalent; but in several garrison towns there is no law requiring examination, or else it is so loosely applied by the municipal authorities that it fails of its purpose. Even when applied with ordinary diligence it does not reach clandestine prostitution nor the many women living in a state of concubinage. It has been proposed to apply the remedy inside

instead of outside, and subject all enlisted men to a weekly examination, those found diseased being placed under treatment and debarred from post exchange and pass privileges. There is no question as to the excellent results of this plan wherever put into practice, but the objections against it are so strong that it is never extended beyond a few posts, and the wisdom and practicability of enforcing it as a general rule is very doubtful. The ratio of alcoholism is likewise high, at least double that of the United States. This is, in a large measure, attributable to the cheap and wretched alcoholic beverages sold in all parts of the island, especially since the prohibition to sell intoxicating drink in the post exchanges.

It is also interesting to compare the western half of the island, comprising four provinces, with the eastern half, comprising the provinces of Santiago and Puerto Principe. In the western half the mean strength of the command is 3,344, and the percentage of admissions only 150, which is less than in the United States. In the eastern half, on the contrary, with mean strength 1,772, the percentage of admissions is 274, not only more than the United States, but greater than for all the islands. The difference depends mostly upon the much greater number of cases of diarrheal diseases and malarial fever, so that, after making due allowance for the personal equation of medical officers and the smaller size of posts, it is safe to conclude, leaving yellow fever out of consideration, that the eastern half of the island does not enjoy as good hygienic and climatic conditions as the western half; thus, five deaths from malarial fever occurred in the province of Santiago and none in any of the other provinces. In my report for the fiscal year ending June 30, 1900, it was also shown that malarial fever gradually increased in frequency and severity from the western to the eastern end of the island.

The ratio of deaths per 1,000 is 13.6 for western and 10.1 for eastern Cuba, a difference due to the 24 cases of yellow fever occurring in the western provinces. If we deduct these, the ratio of deaths will be less for the western than for the eastern provinces.

With the acquisition of our recent knowledge of the propagation of malarial fever it may be taken for granted that this preventable disease will be hereafter greatly reduced and at most posts practically eliminated. As an instance, for the week ending June 23, 1900, there were 34 cases of malarial fever under treatment at Rowell Barracks (Cienfuegos). A year afterwards, for the week ending June 22, 1901, chiefly in consequence of sanitary measures promoted by the post surgeon, Lieut. A. E. Truby, there was not a single case.

Yellow fever.—In my report for the fiscal year ending June, 1900, I described three outbreaks of yellow fever outside of Havana involving American troops—at Santiago de Cuba, Santa Clara, and Quemados. That of Santiago ended in October, 1899, and, thanks to the energetic measures carried out by the chief surgeon, Maj. L. C. Carr, not a single case has occurred since then in that city (troops and civilian population), although previously strongly contaminated. The other two outbreaks came to an end in July, 1900. In June, July, and August, 1900, 30 cases occurred at Pinar del Rio Barracks, with 9 deaths. The first few cases were unrecognized by the surgeon and the infection was allowed to spread before proper measures of isolation were taken. Five sporadic cases occurred at Hamilton Barracks between August and November, but none was permitted to become a focus of infection. The last cases recorded among enlisted men are the nine who were experimentally inoculated by infected mosquitoes at Quemados in December, January, and February, without a single death. Since then all our posts have been absolutely free from yellow fever.

In the summer of 1900, on the recommendation of the Surgeon-General, a board of medical officers consisting of Maj. Walter Reed, United States Army, and Contract Surgeons Carroll, Agramonte, and Lazear, United States Army, was convened in Havana for the investigation of tropical diseases. The result of its experiments, as already well known, was one of the most brilliant medical discoveries of the age, namely, the mode of transmission of yellow fever, and, as a natural consequence, a complete revolution in the methods adapted to prevent and combat this disease. The doctrine of the transmission of yellow fever by the bite of mosquitoes having been proved by incontrovertible experiments on nonimmunes and fomites proved to be harmless, the following circular, having received the sanction of the Surgeon-General, was published:

CIRCULAR, No. 5.

HEADQUARTERS DEPARTMENT OF CUBA,
Habana, April 27, 1901.

Upon the recommendation of the chief surgeon of the department, the following instructions are published and will be strictly enforced at all military posts in this department:

The recent experiments made in Habana by the Medical Department of the Army

having proved that yellow fever, like malarial fever, is conveyed chiefly, and probably exclusively, by the bite of infected mosquitoes, important changes in the measures used for the prevention and treatment of this disease have become necessary.

1. In order to prevent the breeding of mosquitoes and protect officers and men against their bites, the provisions of General Orders, No. 6, Department of Cuba, December 21, 1900, shall be carefully carried out, especially during the summer and fall.

2. So far as yellow fever is concerned, infection of a room or building simply means that it contains infected mosquitoes; that is, mosquitoes which have fed on yellow fever patients. Disinfection, therefore, means the employment of measures aimed at the destruction of these mosquitoes. The most effective of these measures is fumigation, either with sulphur, formaldehyde, or insect powder. The fumes of sulphur are the quickest and most effective insecticide, but are otherwise objectionable. Formaldehyde gas is quite effective if the infected rooms are kept closed and sealed for two or three hours. The smoke of insect powder has also been proved very useful; it readily stupifies mosquitoes, which drop to the floor and can then be easily destroyed.

The washing of walls, floors, ceilings, and furniture with disinfectants is unnecessary.

3. As it has been demonstrated that yellow fever can not be conveyed by fomites, such as bedding, clothing, effects, and baggage, they need not be subjected to any special disinfection. Care should be taken, however, not to remove them from the infected rooms until after formaldehyde fumigation, so that they may not harbor infected mosquitoes.

Medical officers taking care of yellow fever patients need not be isolated; they can attend to other patients and associate with non-immunes with perfect safety to the garrison. Nurses and attendants taking care of yellow fever patients shall remain isolated, so as to avoid any possible danger of their conveying mosquitoes from patient to non-immunes.

4. The infection of mosquitoes is most likely to occur during the first two or three days of the disease. Ambulant cases—that is, patients not ill enough to take to their beds and remaining unsuspected and unprotected—are probably those most responsible for the spread of the disease. It is therefore essential that all fever cases should be at once isolated and so protected that no mosquitoes can possibly get access to them until the nature of the fever is positively determined.

Each post shall have a "reception ward" for the admission of all fever cases, and an "isolation ward" for the treatment of cases which prove to be yellow fever. Each ward shall be made mosquito-proof by wire netting over doors and windows, a ceiling of wire netting at a height of 7 feet above the floor, and mosquito bars over the beds. There should be no place in it where mosquitoes can seek refuge, not readily accessible to the nurse. Both wards can be in the same building, provided they are separated by a mosquito-tight partition.

5. All persons coming from an infected locality to a post shall be kept under careful observation until the completion of five days from the time of possible infection, either in a special detention camp or in their own quarters; in either case their temperature should be taken twice a day during this period of observation so that those who develop yellow fever may be placed under treatment at the very inception of the disease.

6. Malarial fever, like yellow fever, is communicated by mosquito bites and therefore is just as much of an infectious disease and requires the same measures of protection against mosquitoes. On the assumption that mosquitoes remain in the vicinity of their breeding places, or never travel far, the prevalence of malarial fever at a post would indicate want of proper care and diligence on the part of the surgeon and commanding officer in complying with General Orders, No. 6, Department of Cuba, 1900.

7. Surgeons are again reminded of the absolute necessity in all fever cases to keep from the very beginning a complete chart of pulse and temperature, since such a chart is their best guide to a correct diagnosis and the proper treatment.

By command of Major-General Wood:

H. L. Scott, *Adjutant-General.*

Hygiene of posts.—All enlisted men are in comfortable, permanent barracks, with one exception. The cavalry troop at Camp McKenzie, Puerto Principe, are still under canvas, but with the benefit of every improvement that a camp admits of. Five of our largest posts have been built on new selected sites since the American intervention, and combine as many favorable hygienic conditions as possible; the others occupy old Spanish quarters more or less extended and renovated and answering their purpose very well. The disposal of garbage and refuse is simple and effect-

ive; most of our posts, being near the shore, dump everything into the sea; none has a crematory. All the posts built on new sites (Columbia Barracks, Hamilton Barracks, Rowell Barracks, Cabana Barracks, Morro Castle (Santiago) Barracks) are provided with modern sewerage with outlet into the sea. At other posts the milk of lime and excavator system is successfully employed, while a few still use the old-fashioned latrines.

The clothing is, in the main, well adapted to the climate, with the exception of the campaign hat; this should have an all-round space outside the sweat band for ventilation and, if possible, be made of rain-proof material. Since the helmet is impossible in the field, it seems necessary to perfect the campaign hat until entirely satisfactory. The criticism commonly heard against the field uniform, and in which I concur, is its homely simplicity, its lack of military neatness and smartness; for instance, the combination of khaki trousers and blue shirt is not effective from a military point of view, and the efficiency of many men is impaired by their inability to use suspenders. I believe the soldier should always wear an outside garment, let it be ever so thin, whether or not he wears an undershirt; this arrangement has also sanitary advantages well pointed out by Capt. M. F. Steele.

The food is generally satisfactory, and it would be difficult to provide for it better than by existing regulations. Very few complaints have appeared in sanitary reports. It is true, nevertheless, that in Cuba good palatable fruits are neither common nor cheap; that specially those to which North Americans are accustomed and most fond of are very rare and sadly missed, and that vegetables are seldom plentiful. These deficiencies, however, concern the luxuries rather than the necessaries of the soldier's life. The vexed question of the quantity of meat which should be consumed by the soldier in this climate to maintain his most effective health seems to have been practically solved by common experience. It may be doubtful whether North Americans eat as much in Cuba as in the United States, but the proportion of meat to the whole quantity of food consumed is fully as great here as in the colder regions. At Columbia Barracks, our largest and most important post, with a garrison 1,300 strong, fish (canned salmon) is only drawn once a month in lieu of meat; at the other posts in the immediate vicinity of Habana no fish is drawn at all. It is further found that at Columbia Barracks at least 93 per cent (89 as beef, 2½ as pork, and 1½ as chicken) of the meat allowance is consumed, the remaining 7 per cent being traded off for eggs, butterine, and post-exchange articles. With this diet, the number of admissions for diarrhea at that post during the past year was 9.42 per cent, as against 9.45 per cent for troops stationed in the United States.

Particular care has been given to the building, repair, and equipment of post hospitals so as to give sick soldiers all the advantages of modern treatment with the best hygienic surroundings. These hospitals are more or less on the pavilion system, consisting of frame buildings with very free ventilation, double roofs, and wide porches, the wards rather large so as to secure unrestricted air movement. None of the old Spanish stone hospitals are now in use for soldiers, except at Holguin. It has been demonstrated that all classes of surgical operations can be performed in Cuba with at least the same chance of success as in the United States. There is no longer any general hospital in the department, this having been found unnecessary after conditions had settled to those of normal and peaceful times. Every post takes care of its own sick and wounded, with the exception that in cases of major operations surgeons who do not possess the necessary qualifications send their patients to Columbia Barracks or to Morro Castle (Santiago) for treatment at the hands of skilled operators. At Columbia Barracks, Maj. A. N. Stark, and at Morro Castle, Maj. L. C. Carr and Lieut. I. A. Shimer, have done very successful surgical work, for which they are entitled to much credit.

Movements of the troops and medical officers.—On July 1, 1900, the then Division of Cuba consisted of three departments: Department of Habana and Pinar del Rio, Maj. J. R. Kean, surgeon, United States Army, chief surgeon; Department of Matanzas and Santa Clara, Maj. F. J. Ives, surgeon, United States Army, chief surgeon; Department of Santiago and Puerto Principe, Maj. L. C. Carr, surgeon, United States Volunteers, chief surgeon. By General Orders, No. 98, A. G. O., July 23, 1900, these three departments were reduced to two, namely, Department of Western Cuba (including the four western provinces), under Gen. Fitzhugh Lee, Maj. J. R. Kean, chief surgeon, and Department of Eastern Cuba (including the two eastern provinces), under Gen. Samuel M. Whitside, United States Volunteers; Maj. L. C. Carr, chief surgeon, succeeded during leave of absence by First Lieut. Ira A. Shimer, assistant surgeon, United States Army.

On November 15, 1900, the Departments of Eastern and Western Cuba were discontinued, and the division reduced to the Department of Cuba. However, on account of the remoteness of certain posts in the eastern part of the island the prov-

ince of Santiago was organized into a district under Gen. Samuel M. Whitside, United States Volunteers, with complete district staff; First Lieutenant Shimer, chief surgeon, succeeded on his return from leave by Maj. L. C. Carr. This consolidation and the departure of the two regiments of infantry was followed by the abandonment of 11 garrisoned posts, the surplus medical officers and hospital corps men accompanying the troops to the United States or being otherwise disposed of.

There are now in the department 14 garrisoned posts, each with one or more medical officers, and one subpost (Baracoa) in charge of an acting hospital steward (graduate of medical college). There are, besides, one supply depot at Habana and one infectious-disease hospital at Santiago de Cuba, the latter to be turned over to the municipal authorities as soon as possible.

The medical officers on duty in the department on June 30, are as follows:

United States Army:	
Surgeons, with rank of major	4
Assistant surgeons, with rank of captain	1
Assistant surgeons, with rank of lieutenant	5
United States Volunteer Army:	
Surgeons, with rank of major	2
Assistant surgeons, with rank of captain	8
Contract surgeons	13
Dental surgeons	1
Total	34

Of the above medical officers, Maj. W. C. Gorgas is on special duty as chief sanitary officer of Habana, Maj. J. R. Kean as superintendent of the department of charities, and Lieut. I. A. Shimer as sanitary inspector of the city of Santiago. With these exceptions all are on military duty.

In addition to their proper military duties, most medical officers are also necessarily more or less concerned in the sanitation of towns, especially garrison towns. Thus, to prevent the infection of troops, on April 17, 1901, the following circular was published:

HEADQUARTERS DEPARTMENT OF CUBA,
Habana, Cuba, April 17, 1901.

SIR: The department commander directs that the surgeon stationed at your post shall act as medical inspector of the town of ———. He shall advise the commanding officer on all matters in said town which are liable to involve the health of the troops. His chief duties as medical inspector shall be:

1. To keep himself informed of the sanitary condition of the town and to make such special investigations and recommendations as he may deem necessary.

2. To inspect all hospitals in which fever cases are admitted, in order to ascertain the nature and number of these cases, and whether the provisions of circular letter of March 5, issued by the superintendent of charities, by order of the military governor, are being complied with.

3. To investigate the prevalence of mosquitoes, their species, and the extent to which they produce malarial and yellow fever infection, the measures adopted to prevent their propagation, and the success thereof.

4. To ascertain what regulations (if any) are enforced regarding the examination of prostitutes, and their isolation and treatment when diseased.

On the last day of each month (or oftener if necessary), he will report to the chief surgeon of the department, through the post commander, the cases of infectious diseases which ocurred during the month in the town, the general result of his inspections and investigations, and all other sanitary matters whereby the health of the troops may be affected.

A copy of this communication has been furnished the mayor of ——— with a letter which it is hoped will secure his full cooperation in the matter.

Very respectfully,

H. L. SCOTT,
Adjutant-General.

THE COMMANDING OFFICER.

Hospital corps.—The hospital corps consists of:

Hospital stewards	11
Acting hospital stewards	17
Privates	144

The number of non-commissioned officers is somewhat short of requirements, while that of the privates is slightly in excess of the official allowance; a few of the

latter are now being examined for detail as acting stewards. So far as practicable, a hospital school has been organized and maintained at Columbia Barracks, where all corps men ignorant of their duties are sent for training and instruction.

There are also, at present, 8 female nurses on duty in the department, namely, 4 at Columbia Barracks, 2 at Cabana Barracks, and 2 at Hamilton Barracks. These nurses are all women of character, who perform their duties diligently and efficiently. Despite the wisest regulations, female nurses will be now and then, perhaps without any fault of theirs, a troublesome and demoralizing factor at posts, and I believe it will be in the interest of the service to employ them only at large, important hospitals, and never less than two, or still better, three or four together.

Habana.—The work of sanitation in the city of Habana has been prosecuted with undiminished vigor under the able direction of Maj. W. C. Gorgas, United States Army, and with the same gratifying results, as shown by the appended table. The death rate (24.26) has changed but little during the past six months, indicating slight but continuous improvement. Those diseases propagated by mosquitoes, namely, malarial fever and yellow fever, have been very much reduced, while those resulting from defective drainage, absence of sewers, and bad general sanitation, show no reduction, the number of cases of enteritis, on the contrary, having much increased. It is to be lamented that the great work of sewerage and paving, without which the complete sanitary regeneration of Habana is impossible, has not yet been begun; but there is good reason to believe that this much-needed and inevitable improvement will not be postponed much longer. The diseases which, in Habana would be more especially benefited by sewerage are tuberculosis, enteritis and typhoid fever. The mortality of tuberculosis fell from 1,307 in 1899, to 851 in 1900; during the same period, that of enteritis fell from 1,163 to 560, and that of typhoid fever from 240 to 90; but from present indications it would seem that, under existing conditions, the climax of practicable improvement has about been reached, and that the above figures will not be much further reduced until the city is well sewered and the vicious crowding in tenement houses has been remedied. The discovery that mosquitoes breed abundantly in cesspools has also convinced us that there can be little hope of stamping out yellow fever and malarial fever until these cesspools have been replaced by modern sewerage.

The well planned and relentless war carried on against mosquitoes has been productive of remarkable results. Thus, during the first six months of 1900, the mortality from malarial fever was 247; during the last six months, 97, and during the first six months of 1901, only 75. The record of yellow fever is equally interesting. During the first six months of 1900 there were 24 deaths; on account of the unprecedentedly large immigration and consequent increase of nonimmunes the mortality rose to 286 during the last six months, a mortality, however, whose ratio to the number of non-immunes is much lower than ever before in the history of Cuba. It was only during the last winter that the machinery of the sanitary department became fully adjusted to its new purpose the destruction of mosquitoes and protection of patients from their bites; the sequence, if we may not surely say the consequence, is as follows: January, 9 deaths; February, 6 deaths; March, 2 deaths; April, May, and June, none. It is not reasonable to suppose that all infected mosquitoes have been destroyed, and that no more yellow fever is to be expected in Habana; this deduction is especially unwarrantable in view of the fact already noted, that so many of these insects breed in cesspools out of reach; but it seems logical to infer that a large proportion of infected mosquitoes have been killed or rendered harmless, that hereafter cases of yellow fever will be much fewer than last year, in spite of the fact that non-immune immigrants are greatly increasing every month, and that, after the construction of sewers, the complete stamping out of the infection will be quickly and easily accomplished.

Obligatory vaccination.—Smallpox being a constant and increasing danger in Cuba, a commission was appointed, of which the chief surgeon was president, to study the subject and propose a remedy. Upon its recommendation, Civil Orders No. 165, of June 24, 1901, was issued, making vaccination and revaccination obligatory in Cuba, and establishing a central vaccine institute in Habana, with complete modern equipment for the production of the virus needed for the whole island.

Immigration station.—After the close of the Spanish-American war, immigration, which had stopped since 1895, was actively resumed and on a larger scale than ever. During the year of 1899, 16,260 immigrants arrived in Habana; in 1900, 24,124, and during the first six months of 1901, 7,450. As these immigrants furnish the great majority of non-immunes from which yellow fever is fed, it was deemed necessary to take especial precautions to prevent their infection. All non-immune immigrants on their arrival are taken to a detention station, on the healthiest site around the bay, where they await in comfort and safety offers of employment. Earnest efforts are

made to send as many as possible to the rural districts. "In this way all are benefited; the immigrant who procures work without hardship or danger, the city of Habana, which is ridden of dangerous non-immune agglomerations, and employers, who are enabled to get all the hands they require with the least trouble and expense."

REPORT OF MAJ. WILLIAM B. BANISTER, SURGEON, UNITED STATES VOLUNTEERS, CHIEF SURGEON, CHINA RELIEF EXPEDITION.

PEKIN, CHINA, *October 15, 1900.*

I have the honor to make the following report of the expedition to China in the capacity of surgeon, Ninth United States Infantry, and as chief surgeon China relief expedition, as far as concerns the operations of the Medical Department. This report covers the period from June 22, 1900, the date I reported for duty with the Ninth Infantry, to September 25, 1900, when I was relieved from duty as chief surgeon of the expedition by Maj. Francis J. Ives, surgeon, United States Volunteers, per paragraph 1, General Orders No. 19, headquarters China relief expedition, dated Pekin, China, September 25, 1900. By virtue of paragraph 11, Special Orders No. 70, headquarters Department of Southern Luzon, dated Manila, P. I., June 20, 1900, I was relieved from duty as chief surgeon first district, Department of Southern Luzon, and ordered to accompany the Ninth Infantry to China. I was relieved by Maj. W. P. Kendall, brigade surgeon, United States Volunteers, on June 21, and on June 22 reported for duty with the regiment. Only a part of the regiment had arrived in Manila, and was quartered part in the Malate Barracks and part in the Exposition Barracks. First Lieut. Charles E. Marrow, assistant surgeon, United States Army, Contract Surgs. William W. Calhoun and Fred M. Barney were ordered for duty on the expedition. Contract Surg. William W. Calhoun reported on June 25, and the others not until the morning of the 26th, the day of embarkation. This left the entire work of equipping and organizing the medical department to me without assistance, and also the care of the sick of the regiment, which had in great part arrived. One hospital steward, 3 acting hospital stewards, and 16 privates were detailed to accompany the expedition. The hospital steward and 12 privates reported on the afternoon of June 25. Arrangements were made for the companies quartered at the Exposition Barracks to receive medical attention from hospital No. 2, which was close by, and a contract surgeon was detailed from headquarters, Division of Philippines, to hold sick call at Malate Barracks. The requisitions for medical supplies were filled and packed in the medical supply depot in Manila and turned over to the Quartermaster's Department for transportation to the *Logan*. The regiment embarked on June 26, but Capts. Thomas S. McCaleb and George Palmer were sent to hospitals in Manila, as they were incapacitated for field service, also several enlisted men. In a letter from headquarters Ninth Infantry I was directed on June 24 to send the necessary medical supplies, 1 surgeon, 1 steward, and a suitable number of hospital-corps men on the transport *Port Albert*, which transported the stock, which was under charge of 100 men. Acting Assistant Surgeon Barney, 1 acting hospital steward, and 4 privates were detailed for this duty. It soon developed that a great many men in the regiment were suffering from malarial cachexia and dysentery and had avoided going on sick report before leaving, from the fear that they would be left behind. Sixty-one of these men were left on the *Logan* for hospital treatment.

The regiment arrived off Taku, China, on July 6. The First and Second battalions left the *Logan* on separate lighters on July 9, Assistant Surgeon Marrow with 1 acting hospital steward and 4 privates with the First Battalion and I with 1 acting hospital steward and 4 privates with the Second Battalion. Contract Surgeon Calhoun remained on board the *Logan* with the Third Battalion, and an acting hospital steward and 4 privates were left with him. This battalion did not arrive in time to participate in the battle of Tientsin. The First Battalion arrived at the foreign concession of Tientsin on July 10 and the Second Battalion on July 11 about 10 p. m. During the 12th I was occupied in separating the medical supplies from the vast amount of material contained in the lighters and arranging an operating room in the marine hospital, which was under the charge of Passed Assistant Surgeon Oliver D. Norton, who arranged with me for the joint use of this building for the wounded of both the marines and soldiers, and, in fact, it was the only building at the time available. I was in general charge, being the ranking officer, as chief surgeon of the United States forces in China, and during the entire period of our association the army and navy medical departments worked together in perfect accord and with mutual assistance. Our troops were formed for attack at 3 a.m. July 13, and at 3.30 a. m. moved out on the road to the Walled City in conjunction with English and Japanese troops. As our columns came under the fire of the enemy—

rather a long-range fire—we were deployed and advanced on the mud wall in open order. Columns of troops could be seen skirting this wall and, protected by it, advancing toward the main gate. As we advanced 1 man was killed and 7 wounded in the First Battalion. This delayed Assistant Surgeon Murrow, on duty with that battalion, so that after we charged across the bridge in front of the main gate and then to the left over the mud wall I was the only medical officer on duty with the two battalions, though I was not aware of the fact until later in the day. After going over the mud wall we could see another wall, apparently of brick, about 1 mile or a mile and a half off, and this was the wall proper for the Chinese City of Tientsin. Our attack began about 5 a. m. After advancing on to the plain between the two walls the fire of all arms from the enemy was most severe and many of our men were hit. Thirty-two men had been detailed as litter bearers from the regiment, but as soon as the fire became hot they threw the litters down to fight to better advantage. This will always be the case with such details, and the only advantage it presents is that it furnishes transportation for the litters to the field. At the time of the battle none of our transportation which was on the *Port Albert* had arrived. Two privates of the hospital corps remained with me throughout the advance under a most severe frontal and flank fire, assisting me in dragging and carrying the wounded to the shelter of the irrigation ditches which seamed the plain and in which the troops took shelter. These men, Privates Thomas Hamilton and Julius C. Heinze, were recommended by me for a certificate of merit. They also assisted me in having Capt. E. V. Bookmiller removed from the field. After our advance had stopped and the troops were sheltering themselves in the ditches, I concluded to take Captain Bookmiller off the field, as he was so wounded that he had to be held up in the water in the ditch, and the men who were holding him up were becoming exhausted. I was also desirous of making arrangements for the prompt removal of the wounded from the field to the hospital and for their refreshment at the collecting station. I therefore returned with the captain to the main gate of the mud wall and established a station behind the wall, just outside the gate. First Lieut. Charles E. Marrow, assistant surgeon, took my place on the firing line and remained there until the withdrawal of the troops, about 8 p. m., and who, on their withdrawal, brought the wounded with them. In the meantime I had sent for and received a number of "gold medal" cots, malted milk, beef extract, and several cases of mineral water for the thirsty, as the water obtainable was practically poisonous. By 12 o'clock midnight every wounded man was in hospital and on a bed in Tientsin. The "gold medal" cot makes a good litter, and when the patient arrives at the hospital has his bed with him, but it requires six men to carry it, as the hinges in the middle will give way unless supported on both sides.

In this battle 18 men, including Col. Emerson H. Liscum, were killed and 78 wounded out of about 420 engaged. The details above mentioned left First Lieut. Charles E. Marrow and myself as surgeons, available for duty during the battle, and 2 acting hospital stewards and 6 privates, as 2 had been detached for duty with two companies on detached service the afternoon of the 12th. Assisted by Assistant Surgeon Marrow, we examined the wounded as they arrived at the collecting station and gave them such refreshment as seemed necessary previous to sending them into the hospital, where Dr. Oliver D. Norton, of the Navy, had gone to receive them. I also sent Contract Surg. W. W. Calhoun into the hospital to assist Dr. Norton, he having reached the battlefield in the afternoon with the Third Battalion, which came up too late to participate. Assistant Surgeon Marrow and myself remained on the battlefield with our battalions, as it was thought that either our forces would renew the attack at daylight or that we might be attacked by the enemy. Early the morning of the 14th one battalion of the Ninth Infantry entered the Walled City, it having been found that the enemy had evacuated during the night.

Finding that the Marine Hospital was too crowded with wounded, I took possession of the Tientsin Hotel and moved all the wounded officers over to that building, including the wounded officers of the Marine Corps. The regiment was quartered about 1 mile from the nearest of the two hospitals occupied, and as quite a large number of sick were present with the regiment, this necessitated the establishment of a dispensary there. Thus the necessities of the situation required the personnel of the medical department to be divided into 3 portions, and, even with the small number of hospital orderlies with the marines, was inadequate to render proper service to 95 wounded (27 marines wounded), beside attending the sick. This difficulty was overcome by asking for details from the regiment, which worked in the wards under charge of Hospital Corps men. Ice in abundance and boiled water was obtained by me for both hospitals. Our transportation did not arrive until several days after the battle, but I believe there are few instances where wounded have had to undergo less hardships than on this occasion.

On July 19, the wounded officers of the Ninth Infantry were sent to the *Solace* off Taku, with proper medical attendance and supplies, viz: Maj. James Regan, Capt. Chas. R. Noyes, adjutant, Capt. Edwin V. Bookmiller, First Lieut. Louis B. Lawton, and First Lieut. Frank Schoeffel, who was suffering from dysentery. Six enlisted men were sent to the *Solace* on July 21 and 48 on July 24, these patients being sent to the *Solace* under direction of the commanding officer of the American forces in China. All the sick requiring hospital treatment were moved to the Tientsin Hotel and the joint occupation of the marine hospital ceased, but some marine officers still remained in the Tientsin Hotel. One of these was Lieutenant Leonard, who was not in condition to be moved. On July 21 I found it necessary to operate on Lieutenant Leonard, and the left arm was amputated by me at the shoulder joint, by Esmarch's operation. Some wounds became infected from the fact that it was necessary to shelter the wounded in irrigating ditches on the battlefield, and the filthy water soaked some of the dressings. The Mannlicher makes a wound similar in character and effect to the Mauser, and some rather remarkable instances occurred of men shot through the thoracic, abdominal, and pelvic cavities without resulting suppuration or apparently serious effects. A number of our men were hit by shrapnel and these wounds, even flesh wounds, were of a serious nature, lacerating and bruising the soft tissues and comminuting bones, and most of them became infected.

This regiment having served about eighteen months in the Philippines, was very much run down and in extremely bad condition for field service, many of the men suffering from various forms of malarial poisoning and chronic dysentery. Three days before landing every man was given 1 gram of quinine each day, and with a marked decrease in the number of cases of intermittent fever, and comparatively few cases have since developed. I think this measure as a prophylactic one is of decided value, and in this case was tried on about 1,200 men. On July 26, 215 men of the Ninth Infantry were present sick. This did not include 61 patients left on the *Logan* or the wounded. The number steadily increased, and it was readily seen that a base hospital should be established at that point of at least three or four hundred bed capacity, with the necessary complement of nurses and surgeons independent of the regimental organization. After the arrival of the cargo of the *Port Albert*, about July 16, the work of conducting the hospital was much easier, as we were then provided with the use of 1 escort wagon and 4 ambulances, and also had an accession of 1 surgeon, namely, Contract Surg. Fred M. Barney. On July 27 the Fourteenth Infantry began to arrive, and brought with them medical supplies for 5,000 men for three months. With this regiment were five surgeons, namely, Capt. and Asst. Surg. W. F. Lewis, First Lieut. and Asst. Surg. E. R. Schreiner, Contract Surgs. Robert N. Winn, H. N. Van Kirk, and C. F. Dickenson.

Immediately after the battle of Tientsin, when it was necessary to keep the operating table in use day and night, and with a hundred or more wounded in hospital, including the marines, Surgeons Norton, Step, and Gunnel, of the Navy, rendered most valuable assistance. The sick report continued steadily to increase, and on August 1 there were 46 sick in hospital and 192 in quarters, and nearly all suffering from diarrhea or dysentery. On July 30 Maj. Gen. Adna R. Chaffee, United States Volunteers, took command of all the American forces at Tientsin, and under the provisions of General Orders, No. 3, Headquarters China Relief Expedition, dated Tientsin, China, July 30, 1900, I became chief surgeon of the China Relief Expedition. I had recommended that Tientsin be selected as the location for the base hospital, contrary to the course pursued by the allies, for the reason that our supplies were there; that it would be a halfway place when the army advanced on Pekin; that after the wounded had recuperated at the base hospital they could be carried on junks direct to the hospital ship *Relief*, which had been cabled for at my request prior to the battle of Tientsin, and was expected soon, thus making it unnecessary and undesirable to establish a hospital at Taku. Paragraph 2, Special Orders, No. 4, Headquarters China Relief Expedition, dated Tientsin, China, August 1, 1900, directed the establishment of a 300-bed hospital. The Tientsin Hotel hospital was in operation with a capacity of 100. In anticipation of this order the Isabella Fisher hospital had been selected for use as a base hospital, and though its capacity was much below the number of beds required, it had yard room for enough hospital tents to make up the number of beds required, and also a very comfortable dwelling house, with room for an office, wards for officers, and quarters for the surgeons on duty. There was also in connection with the hospital a building suitable in every respect for a number of contract female nurses, who were on a transport in the bay off Taku, and who had volunteered for duty in China while en route to Manila. Upon my recommendation, First Lieut. and Asst. Surg. E. R. Schreiner was put in charge of the hospital, with 2 contract surgeons from the *Grant*, 11 female nurses, 4 acting hospital stewards, and 32 privates of the hospital corps as its personnel. At the Tientsin Hotel hospital, at

the time the expedition left, Contract Surg. Fred M. Barney was in charge, and 1 acting hospital steward and 8 privates, 4 each from the detachments of hospital corps of the Ninth Infantry and Fourteenth Infantry, on duty therein. The number of female nurses was subsequently increased to 16, and 1 professional male nurse, and the number of surgeons materially increased from time to time, as shown by the appended list.

The expedition left Tientsin on the afternoon of August 4. One hundred and seventy-three men of the Ninth Infantry and 27 of the Fourteenth Infantry were left back in Tientsin sick. The American force consisted of the Ninth Infantry, 2 battalions Fourteenth Infantry, Battery F, Fifth Artillery; detachments of the engineer, signal, and hospital corps, and about 500 marines, aggregating in all about 2,500 men. The medical department was distributed and organized as follows:

Chief surgeon, Maj. W. B. Banister, surgeon, United States Volunteers; 1 hospital steward as clerk, and 1 private, hospital corps, as mounted orderly.

Ninth Infantry: First Lieut. Charles E. Marrow, assistant surgeon, United States Army, surgeon; Contract Surg. William W. Calhoun, United States Army; 2 acting hospital stewards and 11 privates, hospital corps; 2 ambulances; 8 chino litter bearers to each company (under guard to prevent their running away).

Fourteenth Infantry: Capt. W. F. Lewis, assistant surgeon, United States Army, surgeon; Contract Surg. Robert N. Winn, United States Army; Contract Surg. H. N. Van Kirk, United States Army; 2 acting hospital stewards and 12 privates, hospital corps; 1 ambulance; 8 chino litter bearers to each company.

Light Battery F, Fifth Artillery: First Lieut. Henry S. Greenleaf, assistant surgeon, United States Army, surgeon; 1 acting hospital steward and 4 privates, hospital corps; 1 push cart.

Marines: P. A. Surg. George A. Lung, United States Navy; P. A. Surg. George D. Costigan, United States Navy; Asst. Surg. Joseph C. Thompson, United States Navy; 2 naval hospital apprentices; 1 cart; 8 chino litter bearers to each company.

One four-mule escort wagon was assigned to the medical department. Two junks and one for the marines were loaded with reserve medical supplies and stores and were to follow by river. The medical, surgical, and detachment chests were carried in the ambulances, and arranged on each side so that they could be used as seats, or with blankets folded over them for patients unable to sit up. This was absolutely necessary, as it was imperative to have these supplies with the regiments and to follow them into action, as I knew from experience that supplies on a wagon with the train would frequently be unavailable at critical periods, though generally available at night as a reserve supply. It was utterly impracticable, with only one escort wagon, to carry an equipment for a field hospital, nor did we have the personnel to have an independent staff and nurses for a field hospital.

The first battle the Americans figured in after leaving our base was that of Yangtsun on August 6, and in this fight our casualties numbered 65. At the beginning of the fight the ambulances were stationed in the rear of the line, just out of reach of the shell fire, and as this range receded on the advance of our line, the ambulances followed up, picking up the wounded after they had received attention, and following the line of battle till filled with wounded, then going as far forward as safety permitted and unloading. They were then employed in collecting all the wounded at this dressing station, and when our troops camped were all moved to this camp by ambulances and wagons, as it was necessary that they should have protection and water, which could only be obtained in the village where the troops camped. The hospital tent and walled tent were obtained from the wagon and pitched for operation shelters, and refreshment was prepared in the way of hot beef tea, etc. The most seriously wounded were dressed first, and 11 of them gotten off that night on a junk to the base hospital at Tientsin, and all the wounded, with quite a number of sick, on the next day, thus disembarrassing the command of the wounded and sick. This was a necessity, as we could not leave the field hospital for their shelter for reasons above stated, nor could we carry them with us.

The next three days the heat was fearful; sometimes 150 men being prostrated and many having convulsions. Some having convulsions and rendered unconscious would in the cool of the evening be able to walk into camp. The ambulances would be filled to their utmost capacity, and on reaching camp would return and haul until all those unable to walk were in camp. The wagon train would also pick up quite a number. Camps were established on the march at Hoshuon, Matao, and Tung Chow, and it was necessary to leave a number of sick at the camps. Contract Surgeon Van Kirk was left at Matao with sick, and subsequently all these stations were provided with surgeons. During a battle the regimental surgeons remained on the line to render first aid, except one in charge of the ambulance station. After the battle they and the men of the hospital corps were assembled at camp dressing sta-

tion to attend to the wounded—a system that was uniform throughout the campaign and worked very satisfactorily, but with larger armies and greater casualties would break down, and should not be depended on in lieu of a properly equipped field hospital with staff and personnel independent of the regimental equipment except where necessity dictates.

In the attack on the wall of Pekin, August 14, there were but 11 casualties, and in the attack on the grounds of the Forbidden City, August 15, 23 casualties. The wounded were moved on August 16 to the field hospital established in a building, in the grounds of the Temple of Earth, and on August 21 were sent in ambulances to Tung Chow, the head of navigation on the Pei-ho and by junk from there to the base hospital at Tientsin. The field hospital at Pekin has a capacity of 150 beds and the maximum number present at one time up to date is 141.

The great majority of men admitted to sick report during the campaign were suffering from intestinal disorders, which is the great scourge of American troops. The greatest need in our equipment at present is a medical cart that can follow each regiment as a traveling dispensary and accompany the regiment when detached. These carts form part of the equipment of the medical department, but I have never seen them provided or in use in the field. The value of the first-aid package has already been demonstrated. The orderly pouch proved defective when used by a mounted orderly as the thread holding the strap to the pouch usually broke, rendering the pouch practically useless. The strap should be riveted to the pouch. The new detached service chest proved invaluable, and I consider it the most complete and valuable article in our equipment. The new aseptic hypodermic syringes, all metal, proved very unsatisfactory, and on forcing out the contents the point would become separated from the barrel. There was a great deal of complaint about the syringes.

First Lieut. E. R. Shreiner, assistant surgeon, United States Army, was relieved of the command of the general hospital at Tientsin on August 20, by Maj. William Stephenson, surgeon, United States Army. The latter was also medical disbursing officer and purveyor. Maj. William H. Arthur, surgeon, United States Army, was appointed chief surgeon, Second Brigade, China relief expedition, Tientsin, on September 14, 1900.

The field hospital at Pekin was under command of Capt. W. F. Lewis, assistant surgeon, United States Army, to whom I am indebted for most valuable assistance throughout the advance on Pekin. The work of the hospital corps detachment was satisfactory, and that of Acting Hosp. Steward Arnold D. Tuttle was specially efficient, and he deserves and has earned promotion to the grade of hospital steward. On September 26, I reported for duty as chief surgeon, First Brigade, China relief expedition, and my connection with the duties of chief surgeon of the China relief expedition ceased.

Summary of casualties which occurred in the United States Army expeditionary force in China, from July 12, 1900, to September 25, 1900.

In action at	Killed.		Wounded.		Total killed and wounded.	Classified location of wounds.					Total.
	Officers.	Enlisted men.	Officers.	Enlisted men.		Head.	Chest.	Abdomen.	Upper extremity.	Lower extremity.	
Tientsin, July 13:											
Ninth Infantry	1	18	5	72	96	14	12	11	26	33	96
Yangtsun, August 6:											
Battery F, Fifth Artillery				1							
Ninth Infantry			1	5							
Fourteenth Infantry		7		51	65	12	6	4	14	29	65
Pekin, August 14:											
Hospital Corps				1							
Fourteenth Infantry				8	9		1		1	7	9
Pekin, August 15:											
Battery F, Fifth Artillery	1			1							
Ninth Infantry		2		3							
Fourteenth Infantry		3		13	23	3	4		3	13	23
About 6 miles southwest Tientsin, August 19:											
Sixth Cavalry				6	6	1	1		2	2	6
Total	2	30	6	161	199	30	24	15	46	84	199

The losses of the United States Marine Corps were: At Tientsin, July 13, killed, 4; wounded, 27; Yangtsun, August 6, wounded, 1; Pekin, August 15, wounded, 1; total killed 4, wounded 29. Total of killed and wounded of the United States forces in the Pekin relief column, 232.

Summary of deaths, period July 12 to September 25, 1900.

Classification:	
Gunshot wounds, killed in action	32
Effect gunshot wounds received in action	14
Heat exhaustion	1
Insolation	2
Dysentery	17
Tuberculosis, pulmonary	1
Typhoid fever	2
Cerebrospinal meningitis	1
Suicide (gunshot wound)	1
Unknown, killed in action	1
Total number of deaths	72
By gunshot wounds	per cent.. 66⅔
By disease	do.... 33⅓

Summary of the personnel of the medical department serving with the troops in China, September 25, 1900.

Medical officers	10
Contract surgeons	21
Hospital stewards	4
Acting hospital stewards	13
Privates	137

REPORT OF MAJ. FRANK J. IVES, SURGEON, UNITED STATES VOLUNTEERS, CHIEF SURGEON CHINA RELIEF EXPEDITION.

PEKIN, CHINA, *April 5, 1901.*

I have the honor to submit the following report of the medical department of the China relief expedition for the period from September 24, 1900, to March 31, 1901, during which time the undersigned served as chief surgeon thereof.

The United States forces in China in September, 1900, consisted of 144 officers and 3,900 enlisted men of the United States Army, and two battalions, each consisting of four companies of United States marines, numbering in all about 800 men, making a total strength of approximately 5,000. Although these marines were a component part of the command, the medical officers on duty with them, who were naval officers, were not required to make the reports incidental to the Army. As these marines left China early in November, I was unable to obtain any records of sickness among them, so that all data quoted in this report pertains solely to the Army. It is presumed that these naval medical officers submitted all necessary reports to the chief of their department.

In the latter portion of September, 1900, our forces were divided into two brigades stationed, respectively, at Pekin and Tientsin, with scattered detachments along the Pei Ho at Peitsang, Yangtsun, Hoshiwu, Matao, and Tungchow, the latter being about 16 miles from Pekin and the nearest point to that city on the river. Owing to the railroad between Pekin and Tientsin not being in operation, it became necessary to ship all supplies by junks on the river, thus necessitating strong garrisons along the waterway, to which the American forces contributed its quota at the places above enumerated. The junks were towed by coolies, and as not more than 15 or 20 miles per day could be traveled it required seven or eight days to make the journey between the two cities. In December the railroad was put in operation and all supplies were subsequently shipped thereby.

Upon assuming the duties of my office I found that a base hospital of 150 beds, under command of Maj. William Stephenson, surgeon, United States Army, and known as the "General Hospital at Tientsin," had been established and was in successful operation at that place. This hospital was well equipped with an adequate quantity of all necessary medical supplies, there being on hand a sufficient reserve for expansion to 300 beds should the emergency for such arise. The personnel of this institution consisted of 7 assistant surgeons, about 40 members of the Hospital

Corps, and 15 trained female nurses. It received the sick not only from the command in Tientsin, but such severe cases from Pekin and the river detachments as could with safety be transferred. In this connection I would state that the journey down the river was speedy and comfortable, and the sick thus transported were, as far as known, in no case injured by the trip. They were invariably accompanied by surgeons and suitable attendants, and everything possible done for their well-being and comfort. The hospital at Tientsin was from time to time depleted by transferring many of the sick to the hospital ship *Relief*, then at anchor at Taku. It was discontinued on November 11, as the American forces at that time had been mostly withdrawn from China, and the garrison at Tientsin had been reduced to two companies of infantry.

The condition of the command in Pekin in September was such as might invariably be expected after the rough and trying experiences to which it had been exposed. What was designated a field hospital had been located in one of the large buildings in the Temple of Agriculture. It was under command of Capt. W. F. Lewis, assistant surgeon, United States Army, and a certain degree of organization had been effected. The sick were segregated and a diet kitchen established. There were in use a number of "Gold Medal" cots, which had been furnished by Captain Ramsay, regimental quartermaster of the Ninth Infantry. In addition to these, a few hand litters were used as cots, but some of the sick were obliged to sleep on the floor, as the cots and litters were inadequate for all, there being about 150 sick in the hospital at that time. There was no hospital bedding, clothing, nor furniture. The sick were forced to wear the clothing in which they entered the hospital, but there was a fair allowance of blankets and Chinese bedding to render them comparatively comfortable. Major Stephenson was directed by wire to ship at once a suitable amount of bedding, clothing, and other necessary supplies from his surplus stores, which, upon their arrival, relieved the most pressing wants until the permanent hospitals were established.

The War Department having decided upon the strength of the command to remain in China during the winter, I was directed by the commanding general of the China relief expedition to make suitable arrangements for the care and accommodation of the sick of a command of about 2,000 for one year. Of this force, two companies of infantry were to garrison Tientsin, the post being designated Liscum Barracks, one company at Tungchow, and the remainder to take station in Pekin. The garrison in Pekin was divided into three sections, the military post known as "Camp Reilly," situated in the Temple of Agriculture, and two detachments, each consisting of two companies of infantry, doing police and provost duty in the two American sections of the city, one in that portion known as the "Tartar," and the other in the "Chinese" city.

The Temple of Agriculture is a large oval inclosure situated in the extreme southern section of the Chinese city, surrounded by a massive brick wall 15 or 20 feet in height with only two gates or entrances, and inclosing about 300 acres. The ground is elevated above the surroundings, is well drained, and in no place are the city residences in juxtaposition to the wall. The inclosure is divided by walls into five or six smaller inclosures, and in the center are situated the altars, temple buildings, and residences of the priests and caretakers. The ground is covered with grass, and there are groves and avenues of cedar trees, many of great age and proportionate size. This site was selected by the commanding general shortly after the military occupation of Pekin, for the use of the American forces, and for hygienic and military reasons a more desirable location could not have been fixed upon.

Medical supplies.—During October an immense quantity and assortment of medical supplies arrived from San Francisco and Manila. These were intended to equip a medical supply depot in China, to be under the charge of Maj. E. T. Comegys, surgeon, United States Army, who had reported for duty in September. Owing to the withdrawal of a large portion of the troops, this station was never established. Such of these supplies as were needed for the command were sorted out and retained, and the balance, by direction of the commanding general, turned over to the quartermaster's department for shipment to the medical supply depot in Manila. The selection and separation of these supplies was attended with serious difficulty, owing to the absence of any marks or lists by which the contents of many of the boxes and packing cases could be determined. Such information is usually shown on the packers' lists, but it has been my experience that the latter are rarely available, especially when most needed. Not only were there many packages unmarked, but I was informed that in some instances old boxes had been used, from which the marks of some previous shipment had not been obliterated. In the present instance a great deal of unnecessary labor could have been avoided had the markings on the packages shown the contents in a more definite manner. It was particularly aggravating to open box after box to find out they contained nothing that was required.

I am not familiar with the regulations governing the shipment of supplies from a medical supply depot, but would urgently recommend that each package shipped should first have every other mark carefully obliterated and then be legibly stamped with, (1) name of depot or consignor, (2) date of invoice, (3) the number, (4) name and address of consignee, (5) contents, (6) the red cross. It has been suggested by Maj. J. C. Byron, depot quartermaster in Pekin, that where packages contain a miscellaneous assortment of articles, tin envelopes with a movable flap or lid be securely attached to the box. The box is marked as above enumerated, with the exception of the list of contents, and into these envelopes cards can be inserted containing all the above data, including a complete list of contents. For a long shipment, three or four or more similar cards to be placed in each envelope, so that one can be retained by each quartermaster through whose hands the consignment passes. This would enable each to keep an accurate check on every article received and shipped by him, and would be of great service to the medical officer ultimately receiving them. Should any article be removed from the case, a note to that effect could be made on the card. The clerical work incidental to manifolding the cards could be easily reduced by means of the mimeograph or other manifolding appliances. Shipping quartermasters have informed me that the red cross mark on the package has proved most valuable in enabling a rapid separation of medical from other property, especially when the shipment is large and supplies from other departments are mixed together. In the case of boxes it should always be placed on the two ends, so as to be visible when they are piled in tiers.

Hospitals.—On September 27, 1900, I addressed a letter to the adjutant-general, urging the immediate establishment of permanent hospital arrangements for the command in Pekin, and submitted plans for the conversion of some of the Chinese buildings in the Temple of Agriculture into a hospital of 150 beds. These plans were such as to render it easy to expand or contract the size of the hospital, should the occasion for such arise. With some alterations these plans were adopted, and what was officially designated as "United States Military Hospital No. 1" was established. This hospital had a fixed capacity of 85 beds, which could be increased to 100 by crowding, and still further enlarged as above mentioned by occupying adjacent buildings, should the necessity present itself. It was imperative that the sick be provided for before the advent of the winter season, and as there was no time to construct suitable wards, it became necessary to utilize such Chinese buildings as were available for hospital quarters. These buildings, owing to their peculiar construction, were poorly adapted for such purposes unless materially altered. They were constructed of massive walls, were closed on all sides except toward the front, and the interiors consisted in each case of one large hall extending to the roof. The two buildings utilized for wards were respectively 30 and 32 feet in depth and about 25 feet in height from the floor to the center of the roof. The roofs were of the curved, sloping design peculiar to all Chinese buildings. The fronts of these buildings had no windows, but consisted of a continuous series of doors about 3 feet wide and 8 feet in height, so that the entire front could, if desired, be thrown open. The main difficulty, therefore, was to provide for suitable heating, lighting, and ventilation. The doors above mentioned were not made of solid wood, but were constructed of an open lattice work, covered on the inner side with white paper. This system of using lattice work covered with paper for doors, windows, and even entire sides of buildings is largely in vogue in China, and seems to serve a very useful purpose. It is cheap, the heat in winter time is retained, and considerable light admitted.

In the present instance all these doors, except a few retained for egress and ingress, were closed and securely sealed. In every alternate one a glass window 3 by 3 feet was inserted, which could be opened when desired. Suitable partitions were then erected to divide the interiors to suit the requirements, and 11-foot ceilings constructed. These ceilings were entirely of Chinese design and conception. They consisted of a light bamboo or reed framework, upon which a layer of brown paper, and over this one of ordinary wall paper, were pasted. Although of the flimsiest character, they proved most serviceable, provided due care was exercised in preventing sudden drafts from without. On one occasion during a high wind an outside door was held open, which caused such a strong draft that the entire ceiling of one ward was torn from its fastenings and lifted several feet, resulting in its almost complete destruction. By observing proper precautions this did not occur again. By thus cutting off the spacious lofts above the wards the latter were most comfortably heated by excellent coal stoves furnished by the quartermaster's department. The wards were ventilated by means of the windows, and every 15 feet along the center of the ceiling there was an opening 18 inches square. In the loft there was an opening about 1 foot square every 15 feet just below the eaves, and at each end, very near the angle of the roof, a window about 18 inches in diameter, which could

be opened or closed by means of cords worked from below. By these means the ventilation was at all times good. All the interior walls were hung with white wall paper of a neat pattern, which made the wards and other rooms present a bright, cheerful, and attractive appearance. An 8-foot inclosed brick passageway was constructed, connecting the two main buildings, which being properly heated, served also as a recreation and smoking room for the convalescent patients. A sink, with earth closets, which could be emptied from without, was also constructed, opening from the passageway.

A building originally intended for a laundry was built in the southeast angle of the court, but was ultimately utilized as a dining room for the detachment and such patients as were not subsisted in the diet kitchen. Another building was suitably partitioned and utilized for administration purposes and quarters for the medical officers. The enlisted men of the detachment of the hospital corps, like all enlisted men attached to Camp Reilly, occupied hospital tents within the hospital inclosures. Two isolation wards made of hospital tents were erected in the southwest corner of the inclosure, but no occasion arose for their use.

This hospital was excellently equipped with a full assortment of medicines, surgical dressings, and hospital stores of all kinds. The folding field furniture was used in the wards and proved most servicable, with the exception of the folding cots with woven-wire mattresses. In most cases these were frail and became easily broken, being inferior to the adjustable folding cots with canvas bottoms. The "Gold Medal" cot was not used in this hospital after the other cots were received, but it proved one of the most useful and serviceable articles issued to our troops. Too much can not be said in praise of this cot for troops in the field, and for a movable field hospital I do not believe any other can compare with it for compactness, lightness, and strength. The new model, which stands higher from the ground, is a decided improvement, especially for hospital purposes.

The operating room was excellently equipped and lighted by means of a large window cut in the south side of the main building. The new mess chests, with service for 100, were used in the dining room. This chest gave the utmost satisfaction. The kitchens were plentifully supplied with all necessary culinary apparatus, and the field ranges furnished by the Quartermaster Department, which were used by all the troops, proved most excellent. I mention these details merely to show that our sick received almost the same care and comfort which would be possible in any of our military hospitals in the United States.

This hospital was commanded by First Lieut. H. S. Greenleaf, assistant surgeon, United States Army. Under him were 3 assistants, about 40 members of the hospital corps, and 6 trained female nurses. The diet kitchen was admirably managed, and everything was done conducive to the welfare of the sick. I do not believe it would be amiss to state that the United States Military Hospital No. 1, in Pekin, was, in point of equipment, the most complete hospital among the allied forces in north China, and it reflected in the most favorable manner upon the Medical Department of the Army. Lieutenant Greenleaf proved himself an efficient and capable officer, and a large part of the success of this hospital was due to his untiring energy and ability.

Military Hospital No. 2 was located in the American section of the Chinese city. Its capacity was 30 beds. It was originally intended for officers and selected cases among the enlisted men. At the time of the withdrawal of the troops in November, 1900, it was under discussion whether or not some of the female nurses then at Tientsin be retained in China during the winter. As there were no accommodations for them in the Temple of Agriculture, it was determined to establish a small hospital in the city where they could all reside and those on duty at hospital No. 1 be each day sent to that place. The plan at first appeared a little cumbersome, but it worked smoothly. The services of these nurses proved most valuable and contributed much to the efficiency of the department. This hospital, under the efficient management of Contract Surg. J. T. Halsell, United States Army, proved of great service and more than fulfilled its original requirements. It was located in the building used by the Canton Club and received the sick from the provost guard. It was discontinued as a separate organization in the latter portion of February and its personnel attached to hospital No. 1.

A 20-bed post hospital was established at Liscum Barracks in Tientsin, and a 6-bed hospital at Tungchow.

Sanitary conditions.—Owing to the apparently total lack of all sanitation on the part of the Chinese, and the indescribably filthy condition of their towns and cities, the sanitary environments at first presented a discouraging outlook. The surface drainage is crude, and although there is no sewer system a few imperfectly constructed underground drains were observed. All trash and refuse is usually thrown into the street,

where it is liable to remain undisturbed indefinitely. In a Chinese house but little garbage exists and that is usually thrown into the streets and devoured by dogs, which are plentiful and seem the natural scavengers. There are apparently no water-closets in the private houses. In all the better classes of residences a small oblong hole about a foot in depth is dug in some secluded angle of the inclosure. This is emptied from time to time, the contents being carried by coolies to a public dumping ground. These privies are used by the women and children, and only in the better class of people by the men. Throughout the city public inclosures are located for "defecatorios." These are used by the poorer classes of men and boys, who merely use the ground, as there are no privies, seats, or even sinks. When the ground in these becomes impassable for pedestrians the night soil is collected and taken to the dumping grounds. Toward the outskirts of the city these "defecatorios," as they were designated, cease to exist, and the male population utilize vacant lots, angles in the walls, and even the public highways. The night soil is considered a valuable asset for fertilizing purposes, and it is therefore not difficult to arrange for its removal. It is collected in certain outlying sections (the dumping grounds previously referred to), where it is piled, awaiting its ultimate transportation to the country. This system is extremely crude and indescribably offensive, and although it may not be the means of contaminating the drinking water, it affords every facility for conveying disease through the medium of flies and dust.

The experiences of the past three years in Cuba and the Philippines, however, have to a large extent familiarized the American Army with the most efficient methods of dealing in such cases, so within a reasonably short period those sections of Pekin controlled by our troops were in a comparatively clean condition.

Quarters.—The troops stationed at "Camp Reilly" in Pekin were housed in tents, all others occupied Chinese houses, which had been previously thoroughly cleaned and put in proper condition for habitation. Considerable discussion arose in the early fall as to the risk of subjecting troops, so lately from the Tropics, to so rigorous a climate with only canvas as a shelter, and many were the forebodings as to the direful results of such a procedure. The undersigned, as chief surgeon, did not see fit to submit recommendations against the occupying of tents, as he believed it was better to remain in the Temple of Agriculture, regardless of the character of shelter to be provided. Had there been opportunity to erect suitable barracks in the inclosure there would have been no argument, but the winter was approaching and skilled labor was difficult to procure, so that the question sifted down to remaining in the Temple of Agriculture under canvas, or occupying Chinese quarters in the thickly settled portion of the city. The former course was adopted with the most gratifying results. Considerable inconveniences and personal discomforts are unquestionably engendered by tent life, but in the present instance these were minimized as far as possible. The tents used were the walled conical, made of drab canvas. I believe that drab or other dark color is unsuitable for ordinary camp use. The interior of the tent is too dark, causing unnecessary discomfort for the occupants and making it more difficult to keep clean. The tents were heated by Sibley stoves converted into coal stoves by erecting an ovenlike base of brick about 3 feet square and 18 inches high. The central portion was hollow, opening above and to the front. An iron grate was fixed in the upper opening and the stove rested over this, being sunk about an inch into the cement top of the oven. These stoves worked admirably and maintained as comparatively even a temperature as is possible under canvas. A few fires occurred, but none of a serious character. One occurred in the hospital, in the tents used by the medical officers for their mess. In this case four hospital tents were consumed, with almost all their contents. The fire spread so rapidly that but little could be removed. The rapid destruction of these tents indicated very clearly to my mind that tents should never be used for housing the sick in winter time unless no other shelter is available, as in case of a fire it would be impossible to remove those inmates unable to escape unassisted. In the present instance the canvas was extremely dry, owing to the extreme dryness of the atmosphere. Still, it must be borne in mind that even in moderately humid climates the heat from the stoves soon dries the canvas most thoroughly and renders it very inflammable.

Bedding and clothing.—All our troops were supplied with "Gold Medal" cots. The clothing was adequate and suitable for the climate. For troops serving in the field a khaki uniform made of some suitable woolen fabric would be more serviceable than the regulation blue. The latter is kept neat and clean with difficulty. In camp it soon becomes dirty and unsightly, and gives the entire command a slovenly and discreditable appearance.

Food.—The subsistence department was abundantly provided, not only with all the component parts of the ration, but with a large assortment of extra supplies. Native beef and mutton were readily procurable. The quality of this meat, although

inferior to the corn-fed beef from our packing houses, compared favorably with the average range cattle of the plains. Considerable rinderpest existed among the cattle in the vicinity of Pekin, and at one time some cases appeared in the commissary herd, but as far as could be ascertained all so diseased were killed, and if any escaped detection and were issued no injurious results followed. Besides the beef and mutton, poultry and eggs were cheap and plentiful. An excellent bakery was established, and an abundance of well-baked, wholesome bread was available. For service in North China the ration as now authorized is excellent in every particular, as is well testified to by the healthy condition of the command and the few cases of digestive diseases.

Water.—All drinking water in Pekin was obtained from wells, the water level being about 30 feet below the surface. These wells are thickly scattered throughout the city, and as there is absolutely no attempt at sewerage one would infer that most of them would be contaminated. Although many unquestionably were, still, where sufficiently removed from adjacent residences, the water in many seemed wholesome. All the water is hard and loaded with salts. In some wells it was found quite brackish to the taste, in others sweet and agreeable. An analysis made for me in the laboratory of one of the German military hospitals of the water taken from a well in the Temple of Agriculture showed an abundance of chlorides and other salts, but no organic matter. In the Temple of Agriculture the water was at first obtained from two wells in the compound ultimately occupied by Military Hospital No. 1, but subsequently the depot quartermaster dug three other wells, as the supply from the first two was inadequate. The water in all was of the same quality, and from the five wells an abundance was obtained for all purposes.

Five distilling plants, each with an alleged capacity of 600 gallons per day, were provided for the expedition. Of these one was put in operation in the fall and another later on in the winter, orders being issued and enforced, requiring the water from these plants to be used for drinking purposes by all troops at headquarters and at Camp Reilly. Shortly after the first plant was erected it was reported to my office by a medical officer that the water was not being properly distilled, but flowed from the coils in almost the same condition as when leaving the well. The matter was at once, and repeatedly afterwards, brought to the attention of the authorities and referred to the depot quartermaster, under whose supervision the plants were being operated, but without material results. The command in the meanwhile used the water as issued, with no noticeable ill effects, a fortuitous circumstance due to the remoteness of the wells from all sources of contamination. Although no evil result followed, it was, nevertheless, unfortunate that after all the expense and trouble incidental to transporting these plants to China they should not have served their legitimate purpose.

Bathing facilities.—The two distilling plants mentioned in the previous paragraph, although distinct failures in so far as furnishing distilled drinking water is concerned, served a most useful purpose in heating the bathrooms and water for bathing. Two commodious buildings adjacent to the men's quarters were obtained and fitted up with facilities for supplying baths for about 20 men each. The distilling plants were located in these, the fire from the boilers rendering the interior temperature of the room warm and comfortable. By turning steam into large caldrons kept filled with water direct from the well an abundance of warm water for bathing was available.

Climate.—The climate of North China during the winter season is bracing, invigorating, and well calculated to produce robustness and healthfulness. The atmosphere is extremely dry, and there is no sudden variation in temperature. From November 1, 1900, to April 1, 1901, there was no rainfall and only two very light falls of snow. There were no facilities for taking maximum and minimum temperatures, but observations were taken and recorded at military hospital No. 1, of the temperature at the hours of 7 a. m. and 7 p. m. During the month of January the maximum temperature thus observed was + 35° F., and the minimum + 2°; the average morning temperature was + 16°, the average evening temperature + 20°. As this month was the coldest during the winter, the above figures give a comparative idea of the daily temperature. Owing to the aridness of the atmosphere and absence of precipitation, the ground becomes very dry, and the soil being alluvial is soon ground into a fine powder along the roads and thoroughfares, few of which are paved. This section of China is visited every few weeks by severe winds of several days' duration. As a result, dust storms of indescribable severity are developed, and constitute one of the most insanitary conditions of Pekin, in addition to causing great bodily discomfort and annoyance. In each case after a storm of this character the sick report materially increased, the additional causes of admissions being affections of the respiratory organs, including pneumonia and bronchitis. Being appointed on

a sanitary commission, in conjunction with medical officers from other branches of the cooperating forces, the purpose being to devise measures for the proper sanitation of the city of Pekin, I brought this matter into prominence, recommending most urgently that means be adopted for street sprinkling. This was subsequently done, resulting in the greatest benefit to all the foreign residents.

Health of the command.—During that period of the military occupation prior to October 1, 1900, the sick report, although large, was in no manner excessive when the severity of the campaign and attending circumstances are taken into consideration. Many of the troops actively engaged, having previously been on duty in Cuba and the Philippine Islands, were necessarily debilitated and proper subjects for disease incidental to a campaign. Digestive diseases, including diarrhea and dysentery, led all others with a total of 2,426 cases, or 43.5 per cent of all. Malarial fever came next with 651, or 11.6 per cent. Accidents and injuries, 577, or 10.3 per cent. Respiratory, 568, or 10.1 per cent. Venereal, 451, or 8 per cent. Cutaneous, 360, or 6.4 per cent, and the others scattering. There was but 1 case of measles and 77 of typhoid fever. All of these latter occurred in the summer and fall, except three, which developed in December. Of the 353 cases of dysentery 351 occurred prior to December 1, and of the 1,710 cases of diarrhea 1,602 occurred prior to November 1. Under the heading accidents and injuries, 258 cases out of a total of 577 occurred during August; these included 14 killed and 100 wounded during the campaign from Tientsin to Pekin and 100 cases of heat exhaustion on that march.

During the winter an excellent opportunity was afforded for meeting the medical officers of the various armies and observing the equipment and organization of their departments. In all cases the medical officers were courteous and cordial in their manner and gave the impression of being men of intelligence and ability.

Equipment.—After a careful examination of the equipment of the various forces in China, I have no hesitation in asserting that the medical department of the United States Army is the best and most intelligently equipped of any service there represented.

Ambulances.—With the exception of the United States the Germans were the only contingent having an ambulance for the transportation of the sick. The British had a two-wheeled vehicle, the "tonga," also known as a "dhanjiboy," used by the Indian troops, which could transport about four in a sitting or semi-reclining position. This was drawn by two animals and was well adapted for a rough, hilly country, but did not present especial advantages over an ordinary ambulance. A comparison as to the relative merits of the American and German ambulances, according to my idea, is absolutely in favor of the former. Our wagon is considerably lighter and in emergency can be handled by two instead of four animals, which is hardly possible with the German. The seating capacity of both is the same, but in an emergency we can load six reclining patients, whereas the other has reached its limit with four. In the German ambulance the seats are arranged somewhat similar to our old-style ambulance, and when in use are rather unstable and rickety. For reclining patients they use the regulation hand litter, four of which belong to each vehicle. It is difficult to conceive of a more simple, compact, and practical method than our present arrangement of making the seats and back serve as litter beds. Unfortunately the ambulances actually in use by our army in Pekin were old, dilapidated, and out of date, so that we were not in a position to demonstrate our superiority except by explaining to our visitors what improvements had been made.

The hand litter in our Army is, for strength, lightness, compactibility, and comfort the superior of any seen in China. The British troops were supplied with what is known as the "dhoolie" litter, of which there are several varieties. The ordinary dhoolie used by the Indian troops weighs 71 pounds. It consists of two A-shaped frames, between which the litter bottom is stretched, suspended at the apex to a large bamboo pole, by means of which the litter is carried upon the shoulders of the bearers, usually four in number. When resting on the ground, the prolongations of the A serve as legs, and a curtain or hood is hung on the framework above the patient to protect him from the sun or rain. There have recently been two modifications to this litter, the Ames and Kay dhoolies. Each reduce the weight to 50 pounds. In the former there is an arrangement by which the litter bottom can be reversed and used as a hammock. The Kay dhoolie can be carried either by hand or suspended to a pole. In the mountainous regions of India, where coolie labor is plentiful and cheap, these litters undoubtedly serve a most useful purpose, but I do not believe them practical in ordinary warfare.

When it may be necessary to carry the sick or wounded a great distance and no wheel or horse transportation is available, I believe this can be accomplished with less difficulty by means of a litter suspended from a pole and carried on the shoulders of the bearers rather than by hand. This would be especially true in locations where coolie or other cheap native labor can be obtained. Our litter might readily be con-

verted into one of this kind by adopting some simple device such as a set consisting of two iron rings 3 or 4 inches in diameter, upon each of which is attached by a closed loop two iron rods, each terminating in a circular ring of sufficient size to fit over the handles of the litter. This would be packed or carried detached from the litter until required for use.

The German litter is heavy and cumbersome and presents no single feature for special commendation. That used by the French army is in many respects similar to the German, but has wooden legs and does not seem as strong or durable.

The Japanese have two litters—a light stretcher without legs, consisting of two bamboo poles, with iron braces and a canvas litter bottom; the second is what they call a "rickshaw" litter, being nothing more than an ordinary "rickshaw" with a sufficiently long body to permit the patient to rest in a half reclining position. Although the Japanese have never had practical experience with these rickshaw litters in actual warfare (those in China were received after the active campaign was ended), I believe they will prove most useful, and the question of experimenting with them in our service would be well worth the effort. The Japanese hand litter is nothing more than a light stretcher, and, having no legs, can only be used for the actual transportation of the sick or wounded. They are admirably adapted for use on the battlefield to transport the wounded from the firing line to the dressing stations, but otherwise do not compare in strength, utility, and comfort to the litter in our service.

In this connection I would state that several years ago the undersigned gave considerable attention toward devising a light stretcher for field use, and at the annual meeting of the Association of Military Surgeons of the United States, held in Washington in May, 1894, he read a paper on that subject, at the same time exhibiting a bamboo litter which he believed might answer the purpose. I still am of the opinion that such a stretcher would be a valuable adjunct to our field equipment in ordinary civilized warfare, the chief advantages being that a large consignment of litters could be rapidly pushed to the front, thus obviating the necessity of improvising, which has practically been shown to be not only a slow and laborious progress but in many instances an impossibility.

First aid packages.—All of the troops of the various cooperating forces were supplied with first-aid packages more or less similar to that in use in our service, although none were as complete. The Japanese contains 1 triangular bandage, 3 compresses of gauze, and a safety pin; the German 1 bandage, 2 gauze compresses, 1 safety pin; the British, 1 piece macintosh 12 by 6, 1 gauze bandage about 12 feet in length, 1 compress. In the British Indian service there is also a triangular bandage; the French, 1 charpie enveloped in gauze, 1 bandage, 1 compress, and 2 safety pins; the Italian, 2 gauze compresses, 1 bandage, and pins. By comparing the contents of these various first-aid packages I believe that the one adopted for our army is superior. The contents of ours seems of better quality than most, and although somewhat more bulky, I believe that the additional articles thus furnished more than counterbalance the slightly increased weight and size.

Hospital corps pouches.—In addition to the first-aid packages the members of the hospital corps of the various foreign contingents were equipped with pouches carried by a sling over the shoulder and containing a specified list of medical supplies. These pouches in many respects resembled that furnished our army, and I observed no feature worthy of special commendation. In the French army, however, they use saddlebags for the cavalry service. In this connection I would invite attention to the fact that the slings for our pouches have been reported as not sufficiently secured. This has been especially observable with mounted men, the jolting of the horse causing one or both fastenings of the sling to give way, which on the march is a most serious defect, there being no means of making the necessary repairs, and the pouch is thereby rendered useless. The French saddlebags present many advantages, but it should be borne in mind that in actual warfare a man is frequently separated from his horse, and when a command is fighting dismounted members of the hospital corps on duty with it should be at or near the firing line. In this case the pouch slung over the shoulder would be of greater service.

Medical and surgical chests.—In the Japanese service each battalion is allowed one set of chests, two in number, a medical and surgical. These panniers are constructed of wickerwork, inclosed in a strong leather case. They are somewhat larger than those in our service, but the contents are, in my opinion, not nearly so complete. The French have a set of four panniers for each regiment, the arrangements and contents of which do not present any special feature for remark. They are constructed of wickerwork and are practically obsolete. The British medical chests comprise a set of ten, of equal size and about the same dimensions as ours. This set is one of the component portions of what is known as a "section," which is actually one-

fourth of a field hospital. Each field hospital has a capacity of 100 beds, and the entire personnel and equipment is specified in regulations. The hospital is subdivided into four sections, each identical in personnel and equipment. The field hospitals are numbered from one upward, and the four sections are designated as A, B, C, D. The section is therefore an independent 25-bed hospital. The chests and everything pertaining to the equipment of the section are distinctly marked, "Field Hospital, No. —," "Section A," as the case may be. The contents of the chests are in many respects obsolete; there is very little idea of compactness and some of the British medical officers admitted that for actual utility they could be vastly improved upon. Assuming that a section is about equivalent to a regimental field hospital, their ten chests in no way compare with our present regimental set, consisting of the medical, surgical, sterilizing, and detachment chests, the box of additional dressings, and the field desk. The German army was, as far as observed, not equipped with medical panniers or chests of any kind, their medicine wagon being apparently substituted. These wagons are of two kinds, furnished respectively for battalions and field hospitals. Of the former, one is supplied each battalion (1,000 men), and of the latter, two to each field hospital. The wagons are divided into compartments opening to the sides and rear, and are very serviceable and complete. Those for the field hospital are considerably heavier than the others, and would on ordinary rough roads require four animals, although on the smooth roads of the continent two might be sufficient. The interior arrangement consists principally of a series of drawers resting on the side and slid into the bed of the wagon by small rollers. These drawers, when pulled out, present the appearance of small cabinets about 3 feet square, open at the front. They are rather elegant in design, and when arranged around a room in two rows, one above the other, give very much the appearance of a well-appointed dispensary. The contents are well secured, the bottles are square and arranged in slots on shelves, so that the danger of breaking is slight. The medicines in these wagons are principally tabloids, and the dressings are well selected and of good quality. There was considerable dispensary paraphernalia, such as mortars and pestles, etc., which in their various compartments looked very well, but I believe the space thus employed might be better utilized. The tabloids are more bulky than those in our service, and in nearly every case had the name and quantity of the drug printed on each tabloid. This wagon has the advantage of enabling a larger and more complete assortment of medical supplies to accompany each command. Its chief disadvantage is that should one or more of the animals assigned it die, become sick, or be arbitrarily withdrawn by the commanding officer, the entire fabric goes to pieces, which might not necessarily be the case with a set of chests.

Transportation for field medical supplies.—In this respect I believe the United States Army is inferior to the German, British, Japanese, French, and possibly many others. In our service the Medical Department, being dependent for the transportation of its supplies entirely upon the Quartermaster's Department, is seriously handicapped and frequently made subject to criticism which should not justly be laid at its door. When a regiment goes into active service, a certain portion of the medical supplies, in addition to what is carried by the men, should at all times be in touch with the troops and available for use at short notice. These supplies should include the medical and surgical chests, additional dressings, litters, and such other articles as may be designated by the Surgeon-General as belonging to a regimental equipment. The German medicine wagon fulfills these conditions, but in the French and Japanese services each regiment is furnished with a small one-horse vehicle on two wheels, for the sole purpose of carrying these supplies. Such a wagon can be so constructed as to readily follow troops in all but the most difficult mountainous country, to be sufficiently strong to stand the usual wear and tear of the service, and light enough to require but one animal on ordinary roads. The Japanese wagon was small, low, and moderately broad, constructed very much on the plan of railroad station trucks for handling baggage.

At present in our service the medical chests, litters, and other necessary articles are packed securely in one of the wagons of the regular wagon train, which is possibly miles in the rear and never available in case of emergency. I believe a light wagon as above described would prove far more serviceable than pack animals, unless the troops were operating in a country impassable for wheel transportation of any kind. Another important element is that the Geneva Convention does not recognize the quartermaster's transportation, and troops on the firing line should be provided with a distinctive wagon bearing the red cross, which could not under any circumstances be diverted by commanding officers to illegitimate uses. As a matter of fact, this should apply to all medical transportation, but it is especially applicable to the wagons under consideration.

The Russian troops withdrew from Pekin before an opportunity was afforded to

inspect their equipment, but one article used by them on the march struck me as most serviceable in times of actual warfare. This was a large, circular metal caldron with a closed lid, having a capacity of 25 or 30 gallons, supported on wheels, the bottom of the caldron being 10 or 12 inches from the ground. This was easily drawn by one horse or mule. It is used for making soup or stew. In the Santiago campaign such an apparatus for our troops would have been of incalculable benefit.

Military hospitals.—Although the various hospitals in Pekin were originally organized as field hospitals in the strict sense of the term, when the permanent garrisons were established efforts were made to equip the individual hospitals to as high a standard of perfection as possible.

The Germans had two field hospitals of 200 beds each and a marine hospital of 100 beds. These were located in Chinese buildings in sections of the city convenient to their troops. The general equipment, as compared to the United States Military Hospital No. 1, was crude. The cots were of iron and folded in the center, making a rather unwieldy and weighty package 3 by 3 feet, of such a nature as to be difficult to transport and pack. I saw no effort to provide other folding furniture, and the bedside stands, tables, chairs, and benches seemed to have been rather roughly extemporized. Some mattresses were in use, although bed sacks filled with straw were employed to a considerable extent. There seemed to be a good allowance of blankets and bed linen of suitable quality. All patients not in bed were required to wear hospital clothing made from material resembling bed ticking. The kitchen was well and systematically regulated; in it was hung a large blackboard from 4 to 5 feet square, lined and ruled in white paint with the vertical columns for the various kinds of diet, and the number of each ward on the horizontal lines. This served as an excellent general guide for the cooks. The quality and quantity of the food was good, but in no way compared to the commissary department of our army. The wards were well ventilated and heated by means of large brick ovens constructed in each. A bathroom was attached to each ward, and the arrangements for removing the night soil were sanitary. Each hospital was provided with an excellently equipped operating room. Excellent disinfecting plants were established in each for bedding, clothing, etc., and also a well-equipped bacteriological and chemical laboratory. In these last two respects the Germans were superior to any of the forces in Pekin, including our own; but otherwise our equipment was in every way more serviceable and complete. After the United States, the Germans came next in point of hospital equipments. I endeavored to ascertain the extent and character of the prevailing diseases amongst them, but their medical officers seemed unwilling to impart information. However, in going through their wards, the large number of cases of typhoid fever and dysentery was apparent to the most casual observer; in fact, at times an entire ward, with 20 or more patients, seemed affected with these diseases. As my visits were made during February and March, when there were practically no typhoid and dysentery amongst the American troops, it would look as if our sanitary measures were superior, both of the above being preventable diseases.

The personnel of a German field hospital consists of 6 commissioned medical officers (the senior with the rank of major), 1 chief steward (who seems to rank higher than the hospital stewards in the United States Army, being, I should judge, similar to the highest warrant officers in the Navy), 11 noncommissioned officers, 12 nurses, privates, 1 wagon master, 18 men (laborers), 1 bookkeeper, 1 druggist—a total of 6 commissioned and 45 enlisted men.

British.—The British had but one hospital in Pekin, situated in a new and spacious compound known as the Chee Foo palace. With the exception of a limited number of iron cots and bedding, this hospital had practically no equipment beyond that of the regulation field hospital. It consisted in part of two field hospitals of four sections each, thus affording separate organizations for the native Indian and British troops. The division is essential in that service with mixed commands, owing to caste prejudices and the necessity of preparing the food in certain ways for the natives. The British hospital was clean, well ventilated, and the usual sanitary regulations enforced. Their kitchen and mess equipment seemed deficient, and no system nor arrangements for special diets for the sick were noticed.

There did not appear to be an unusual amount of sickness amongst the British and native troops, the character of diseases among the former being very similar to that amongst the Americans. I believe smallpox broke out amongst them, but only a few cases occurred, and no epidemic was even threatened. A very singular feature about the native troops is their apparent immunity from typhoid fever. Although totally unaccustomed to the vigorous climate of north China, they seemed to stand the winter well, and comparatively few succumbed to pneumonia and other pulmonary diseases.

Japanese.—The Japanese had 2 field hospitals of 200 beds each. These were arranged very much on the order of the German, but were not so comfortably

equipped. The cots were principally extemporized and the bedding, clothing, etc., of a crude quality. Their operating room was provided with an excellent assortment of surgical instruments, belonging to the field equipment. One of the principal diseases amongst them was beri-beri. There were some cases of typhoid. I do not believe they suffered as extensively from diarrhea, dysentery, and digestive diseases as the European and American troops. This would be easily accounted for, from the similarity of the food and natural conditions of the country.

Organization.—As the Medical Department of the United States Army is practically without any specific organization, they were in that respect different from any of the allied forces in Pekin.

A careful study of the various organizations reveals the fact that whereas they are for the most part suitable for coherent masses of large bodies of troops, they are not well adapted for the scattered detachment service, such as our Army is liable to perform. The problem then arises, Can a system be devised which can be readily convertible to both conditions? The British system is very similar to that in our Army with the addition of the regularly organized and equipped field hospitals previously mentioned. This latter gives them a certain mobility which is sadly lacking in our service. For instance, when the various brigades of British troops were ordered from India to China, the commanding general in his order merely designated that such and such field hospitals (giving numbers) should accompany the command. This was all that was necessary, and a few words expressed what in our service would have required much previous thought and calculation to effect.

The Japanese organization is on a more elaborate scale than others. Each regiment has 6 medical officers, 3 hospital stewards, 12 privates of the hospital corps, and 48 assistant stretcher bearers (4 from each company) detailed from the line. In addition to these there is a sanitary corps of 500 men for each division. This is usually under command of a field officer of the line and is divided into 2 companies of 250 men each. One of these companies carry the wounded from the first dressing stations to the second line, known as the "collecting stations," and the second company carry them from there to the field hospitals. This force of hospital men comprises over 6 per cent of the total command.

In the German army there are 6 medical officers with each regiment, 2 to each battalion. One noncommissioned officer of the hospital corps is assigned to each company, and 4 men from each company are designated as company bearers. In addition to this, each division has one company, consisting of 6 medical officers and 100 enlisted men, who act as litter bearers. This company has 8 ambulances and 72 litters. It advances as near as possible to the firing line without unnecessary risk, and there establishes stations, to which the wounded are brought by the company bearers. The sanitary corps then takes charge and transports the wounded to the rear. In addition to the above, each division has 6 field hospitals of 200 beds each. A division consists of 4 infantry regiments of 3,000 men and such artillery and cavalry as may be assigned it.

Each French regiment has 4 medical officers and 12 enlisted men of the hospital corps, 1 to each company. As in the German and Japanese services, company bearers are detailed from the line. The wounded on the firing line are carried to the first dressing stations and from there to what is designated their ambulance stations. Here the function of the company bearers cease. These ambulance stations are in reality temporary field hospitals, with a capacity of about 50 patients. There is apparently only one of these ambulance stations to a division. Still farther to the rear there are, for an army corps, 6 field hospitals of about 100 beds each. Behind these are the general and base hospitals. I was unable to obtain figures as to the complement of officers and enlisted men for these various hospitals, but inferred from remarks of the medical officers that the strength of the hospital corps was about 4 per cent of the total strength of the command.

It is thus seen that in the principal foreign armies the system of company bearers seems to be generally adopted. I inquired as to the use of musicians for hospital purposes on the battlefield, but was unable to obtain much satisfaction.

To minutely relate all one's observations and impressions during this remarkable period would require more space than the limits of an ordinary report would warrant. I have therefore endeavored to restrict my remarks to what appeared to me the most salient features, and as such respectfully submit them.

In conclusion, I would state that the conduct of the medical officers and enlisted men of the hospital corps of our army was such as to reflect credit upon the department. Their duties were performed in a thorough and efficient manner, as was amply demonstrated in the admirable results obtained. These results brought the medical department prominently forward as an evidence of the efficiency of the United States Army, and enabled it to contribute its quota to the laurels won in the presence of the combined armies of the world.

PREVALENCE OF SPECIAL DISEASES.

SCARLET FEVER, DIPHTHERIA, MUMPS, MEASLES, ETC.

Cases of scarlet fever, diphtheria, and cerebrospinal fever were, as usual, rare among the troops. Measles and mumps were, on the other hand, of quite frequent occurrence. In the United States measles had an admission rate of 11.36, the mean annual rate for the previous decade having been 8.46 per thousand of strength. The infection of this disease was imported into the Philippine Islands on almost every transport. The admission rate for volunteers in these islands was 8.18 per thousand of strength, and for regulars 1.61. Similar rates prevailed as regards mumps.

REPORT OF EPIDEMIC DISEASES ON THE UNITED STATES ARMY TRANSPORT KILPATRICK, DATED MANILA HARBOR, MAY 13, 1901, BY CONTRACT SURGEON JOHN P. KELLY, UNITED STATES ARMY.

I have the honor to forward the following report of the recent outbreak of epidemic diseases on board the U. S. army transport *Kilpatrick:*

Measles made its appearance on board April 5, 1901, in the case of a private of Company G, Fifteenth Cavalry; other cases followed in rapid succession. Several of the patients stated that the disease prevailed at the Presidio of San Francisco and Angel Island, Cal., at the time of their departure from said places to join the *Kilpatrick;* anyway, there were about eight or ten of the patients in the incubative stage of the disease when they came on board this ship.

Variola was the next infectious disease to make its appearance in the case of a private of Company M, Eleventh Infantry, a recruit enlisted March 22, 1901, at Minneapolis, Minn. He arrived at San Francisco, Cal., April 1, 1901, and was sent on board the *Kilpatrick* April 5, where he was admitted to hospital April 6. Another case of variola was admitted to hospital April 7, that of a private of Company M, Eleventh Infantry, a recruit enlisted March 26, 1901, at Oklahoma City. He arrived at San Francisco, Cal., March 30, and was sent on board the *Kilpatrick* April 5, 1901. Both of these patients stated that variola prevailed at their places of enlistment at the time of their departure to join the troops at San Francisco, Cal. One stated that variola was very prevalent at Oklahoma City while he was there. He also said that while working in that city just previous to enlisting he would often meet cases of variola on the streets while going to and from his work; that the city authorities at first tried to quarantine certain smallpox districts, but that the disease became so widely disseminated and was of such a mild type that the people did not think it of enough importance to take to their bed and be treated; deaths due to the disease were rare. Taking the statements of these two patients, together with the fact that they were the only ones on board to develop the disease at that time, and considering the incubative stage (twelve to sixteen days) of the disease, I hardly think there is any reason to doubt that these men were infected at their places of enlistment. The third case of variola was that of a sergeant of Company I, Eleventh Infantry, admitted to hospital April 24, 1901. This man was no doubt infected by the previous cases.

Mumps next manifested itself in the case of a private of Company M, Eleventh Infantry, admitted April 11. Patient stated that the disease prevailed at the Presidio of San Francisco, Cal., where he was stationed previous to joining the transport *Kilpatrick,* April 5, 1901.

No other case of mumps followed this until April 28, when a second case appeared, followed in rapid succession by several others.

Measles progressed until April 26, at which time it began to decline gradually. Treatment was as follows: Acetanilid for high temperature, diaphoretics to assist in bringing the eruption well to the surface, regulating the excretory channels, liquid diet, and rest in bed. For variola: Removal to isolation ward, immediate vaccination, acetanilid for high temperature, chloral hydrate and bromide of potassium for restlessness; room darkened; plenty of ventilation; inunction with ichthyol ointment, 1 dram to the ounce of petrolatum spissum; nutritious diet, and rest in bed.

Mumps continued to increase until five or six days before reaching Manila, P. I. Treatment: Regulation of the excretory channels, rubbing the swollen glands with camphorated oil, in some instances using equal parts of glycerin and alcoholic extract of belladonna; lead and opium lotion in cases of orchitis.

The means used to prevent the further spread of these diseases were immediate

isolation of patients along with their effects, fumigating by the burning of sulphur, and the walls and floors scrubbed with 1 to 500 bichloride of mercury solution. The quarters of the troops were thoroughly fumigated and disinfected. Vaccination of all on board not previously vaccinated and revaccination of those not exhibiting satisfactory and recent cicatrices. Rigid inspections of the entire ship daily and the laws of hygiene enforced to the letter.

Below will be found a list of patients transferred to the United States Marine-Hospital Service quarantine and detention station at Honolulu (between the dates April 13 and 21, 1901, respectively) while quarantined off the harbor of the above-named place. A second list gives the total number of cases of infectious diseases originating on board since leaving San Francisco, Cal., April 5, until anchoring in Manila Bay, May 12, 1901.

Transferred to United States Marine-Hospital Service quarantine and detention station at Honolulu.

	Cases.
Measles	29
Smallpox	2
Mumps	1
Lobar pneumonia	2
Urinary fistula	1

to pass through this detention station to United States Army hospital at Honolulu for treatment.

List of cases of contagious and infectious diseases originating on board since leaving San Francisco, Cal.

	Cases.
Smallpox	3
Measles	31
Mumps	32
Lobar pneumonia	2
Total	68

No death occurred on board during the voyage. The *Kilpatrick* anchored in Manila Harbor at 7 p. m., May 12, 1901.

REPORT OF CAPT. FRANK P. KENYON, ASSISTANT SURGEON, UNITED STATES VOLUNTEERS, ON MEASLES AND MUMPS ON THE TRANSPORT HANCOCK, DATED MANILA HARBOR, APRIL 18, 1901.

On March 25, 1901, I sailed from San Francisco, Cal., on the U. S. army transport *Hancock*, in charge of four troops of the Sixth United States Cavalry and four companies of the Seventh United States Infantry, composed of 14 officers and 885 enlisted men. On March 28, four days out, 2 cases of measles were discovered, one in the cavalry and one in the infantry. These cases with their effects were promptly placed in the isolated hospital and all commanding officers were instructed to notify their medical officers of any indisposition among the troops. On reaching Honolulu, March 31, these cases were transferred to the military hospital at that place.

On April 9, twelve days later, 3 cases of measles developed; and from April 9 to 12, 24 other cases appeared, about equally divided between the cavalry and infantry. These cases were promptly placed in hospital and the attendants strictly quarantined, no one having any duties about the hospital being allowed to come in contact with any other member of the ship. Up to this date no other case has developed.

Considering that measles broke out simultaneously in two distinct troops, with many new recruits on board ship, I think we were very successful in checking the disease.

Twenty-three cases of mumps also developed en route, 2 having come on board at San Francisco.

All cases of measles and mumps were promptly isolated, including their attendants. Several cases of the latter disease are still under treatment in hospital.

TYPHOID FEVER.

No epidemic of typhoid fever occurred among the troops during the year. In the Army as a whole the admission rate was 9.74 per thousand of strength and the death rate 1.63, as compared with the mean

annual rates, 5.19 and 0.56, for the ten years preceding the outbreak of the Spanish-American war. Among the troops in the United States the admission rate was 5.56 and the death rate 0.43 per thousand of strength. The largest admission rate was given by the command in China, 27.73 per thousand, and the largest death rate 2.11, by the troops in the Philippines. The smallest prevalence was reported from Cuba, 4.72 per thousand men, with a mortality of 0.92 per thousand. In addition to these, there was quite a large admission rate for fevers of undetermined causation, most of them probably typhoid fever of mild character, as these cases had practically no death rate. When these rates are compared with the admission rate, 141.59, and the death rate, 14.83 per thousand of strength in 1898, and the corresponding rates, 20.69 and 2.44 in 1899, the satisfactory record of the past year is manifest.

YELLOW FEVER.

During the calendar year 1900 there were 144 cases of this disease, 32 of which were fatal, reported from the Army, showing for the whole Army, regulars and volunteers, with a strength of 100,389 men, an admission rate of 1.43 and a death rate of 0.32 per thousand of strength. During the decade 1889–1898, the mean annual admission rate was 2.08 and the death rate 0.25 per thousand men. The cause of this gratifying decrease in the prevalence of this dangerous disease is explained, page 179 of this report, under the heading "Board for the study of the etiology and prevention of yellow fever."

MALARIAL FEVERS.

The rates for malarial disease were heavy during the year, owing to the great prevalence of these diseases in the Philippines and Cuba. The admission rate for the whole Army was 706.52 and the death rate 1.36, as compared with the mean annual rates of the decade 1889–1898, 174.29 and 0.58. The rates for the volunteers in the Philippines were: Admission, 1108.75, and death, 1.98; for the regulars, 742.82 and 1.64, respectively, per thousand of strength. Cuba followed with an admission rate of 581.35 and a death rate of 1.04. In Porto Rico and China the prevalence and mortality were relatively light. In the United States the admission rate was 166.20 and the death rate 0.05 per thousand of strength.

During the current year so much has been done in the practical application of methods for the prevention of malarial diseases, based on the diffusion of our knowledge of the means by which these diseases are propagated by infected mosquitoes, that a safe prognostication may be given of a lessened noneffiiciency from these diseases in the next report of the Surgeon-General of the Army. On October 15, 1900, a circular from the headquarters Department of Western Cuba was published for the information and guidance of post commanders. It embodied the recommendations of the chief surgeon, Maj. Jefferson R. Kean, surgeon, United States Volunteers, and required action to be taken as thus recommended. The same requirements were afterwards, December 21, 1900, published in General Orders, No. 6, Headquarters Department of Cuba. These called for the use of mosquito bars in all barracks and especially in all hospitals, and for the destruction of the larvæ or young mosquito, commonly known as wiggletails or wigglers, by

the use of petroleum on the water where they breed. According to the order:

The mosquito does not fly far, and seeks shelter when the wind blows; so it is usually the case that every community breeds its own supply of mosquitoes in water barrels, fire buckets, or undrained puddles, post holes, etc. An application of one ounce of kerosene to each 15 square feet of water once a month will destroy not only all the young but the adults who come to lay their eggs. The water in any cistern or tank is not affected in the least for drinking or washing purposes if only it is drawn from below and not dipped out. For pools or puddles of a somewhat permanent character draining or filling up is the best remedy. It is recommended that the medical officer who makes the sanitary inspection at each post be charged with the supervision of the details of these precautions.

Subsequent to this, sanitary reports from every post in Cuba made note of the relative prevalence of mosquitoes and of malarial fevers during the previous months and of compliance with the provisions of General Orders, No. 6. Special attention was always given to such places as bell traps not in frequent use, fire buckets, and generally to all accumulations of standing water which might serve as breeding places for the mosquito, even to such small collections as are found in the hoof prints of animals in soft or marshy ground. In several instances the recommendation was made that the long grass in the neighborhood of the barracks, which serves as a place of rest for mosquitoes during the day, be cut close to the ground, and in others that the officers of the post be assembled at such time and place as the commanding officer may direct to hear the views of the surgeon on the rôle played by the mosquitoes in the propagation of yellow fever and malarial diseases, and the means of suppressing these diseases.

As illustrating the benefit resulting from these measures, the chief surgeon of the department states that, for the week ending June 23, 1900, there were 34 cases of malarial fever under treatment at Rowell Barracks, Cienfuegos, while a year afterwards, during the week ending June 22, 1901, there was not a single case.

EXTRACTS FROM SANITARY REPORTS FOR MARCH, 1901, FROM CUBAN POSTS.

Rowell Barracks, Cuba, First Lieut. Albert E. Truby, assistant surgeon, United States Army.—Practically no mosquitoes. *Culex fasciatus* and *Culex pungens* only species found during past month. No recent cases of malaria. This condition due to excellent drainage and constant vigilance to prevent propagation. Oil and covers used to all standing water.

Columbia Barracks, Habana, Cuba, Maj. J. R. Kean, surgeon, United States Army.—Mosquitoes have been rare at this post until the last week, when they have been quite numerous. Breeding places in the post and vicinity have been sought for without success. As south winds have in the past been prevalent, during this time it is possible that they have come from beyond the inspected zone, and observations in Marianao and its vicinity are being made. Petroleum is used on all standing water on the reservation, and steps are being taken to screen all buildings occupied by the garrison as barracks and quarters, and by the sick. *Culex pungens* is the only variety found during the month. Four cases of malaria have been admitted during the month, of which only one, a civilian teamster, seems to have been a primary affection.

Piroteenia Militar, Habana, Cuba, Contract Surg. E. B. Barnet, United States Army.—Mosquitoes are not abundant in and about this post at the present season. The most common are the *Culex pungens*, *Culex fasciatus*, and a few specimens of *Anopheles*. They come through the wind, as there are no stagnant waters in these surroundings. Crude petroleum is put in every place where water is kept. We have not had a single case of fever at this post during this month.

Headquarters of Artillery, Defenses of Habana, Cuba, Vedado, Habana, Cuba, Contract Surg. P. C. Field, United States Army.—Mosquitoes much less noticeable than same date last year. Ordinary species, but *Culex fasciatus* less frequently seen. All varieties in large numbers with south wind. No breeding place discovered within military zone of camp. Seventeenth, Twenty-second, and Twenty-fourth Companies,

Coast Artillery. Crude oil has been very carefully used at possible breeding places. No new malarial patients at this hospital during the month.

Hamilton Barracks, Matanzas, Cuba, Capt. J. Hamilton Stone, assistant surgeon, United States Army.—With difficulty a few mosquitoes can be found, but they are not troublesome. The *Culex* is the prevailing species; rarely an *Anopheles* is seen. There has been a marked reduction in the number of cases of malarial fever since existing orders have been complied with.

Yellow-fever hospital, Santiago, Cuba, Lieut. George A. McHenry, assistant surgeon, United States Army.—Mosquitoes exist at the yellow-fever hospital in varying numbers, depending largely on the direction of the wind; the yellow-fever hospital grounds are bounded on the north by an extensive marsh, an ideal breeding place for mosquitoes, and in the absence of the sea breeze they are here in immense numbers and very troublesome. They are the *Culex fasciatus* species. Water barrels and all collections of fresh water are kept covered with mineral oil and the grounds are kept hoed clean from vegetation.

Santa Clara Barracks, Habana, Cuba, Contract Surg. E. B. Barnet, United States Army.—Very few mosquitoes are found in or about the quarters of this post at present. Those seen are as a rule *Culex fasciatus*, only an occasional *Anopheles* being seen. Breeding places near post all dried up for the last three weeks. Larvæ are destroyed by covering all breeding places within 500 yards of the post with crude petroleum. Those present believed to have been carried here from inland by south winds, which at times prevail. No malaria at this post during the month.

Lieut. J. R. Devereux, assistant surgeon, United States Army, made some interesting observations on the prevalence of malarial fevers at Washington Barracks, D. C., and at the general hospital on the reservation of that post from April 1, 1900, to September 1, 1901. He shows in his report that the barracks and the general hospital are about 1,000 yards apart, but in other respects are apparently under similar conditions as regards malarial diseases. The average temperature, rainfall, and wind velocity are practically the same in both localities. In 1900, 4.4 per cent of the hospital corps detachment at the General Hospital were affected with malarial fevers while the garrison of the post had 27.3 affected. In 1901 the hospital corps men had 3.4 per cent affected and the garrison 6 per cent. In the former year the barracks rooms of the hospital corps men were well screened while those of the post were not thus protected. During the latter year the barracks of the post were screened and vigorous efforts made for the destruction of the mosquitoes on the reservation.

CONSUMPTION.

For tuberculosis of the lungs the admission rate for the year, 4.92 per thousand of strength, was much higher than the mean annual rate of the previous decade, 2.66. The rate of discharge for disability was 1.36, as compared with 1.40 for the previous ten years, and the death rate, 0.96, as compared with 0.48 as the mean annual rate for the decade. The admission rate was higher, 5.27, in the United States than in any of the other commands except that serving in China, where a rate of 7.70 was recorded. The lowest rate, 3.80, was recorded in Cuba, but this does not mean that the prevalence of consumption in the West India Islands is notably less than in the United States, for the command in Porto Rico gave an admission rate of 4.59 per thousand of strength. It is believed that the sanatorium for consumptives recently established at Fort Bayard, N. Mex., will be of great value in the recovery of incipient cases of this disease. Of 167 patients who had been under treatment an average of 5.4 months and were discharged during the year ended June 30, 1901, 10 were clinically cured, 26 were convalescent, and 73 improved.

VENEREAL DISEASES.

The admission rate for these diseases for the whole Army during the year 1900, was 133.97, and the discharge rate 2.36 per thousand of strength, as compared with 133 and 2.61 during 1899, and with 71.45 and 1.22, the mean annual rates of the decade 1889–1898. These large rates prevailed in all the commands except among the volunteer troops serving in the Philippines, the admission rate for these having been 79.94, and the rate of discharge 0.41 per thousand of strength. Among the regular troops in the Philippines the rates were respectively 138.88 and 0.96; among troops serving in the United States, 155.39 and 7.29. In China the admissions rose to 173.60, but there was no discharge for disability. In Cuba the admission rate reached 190.68, with 4.03 discharges per thousand of strength, and in Porto Rico the excessive admission rate of 367.88 was reached.

The following tabulation shows the relative prevalence of these diseases among the various commands by comparative rates of admission per thousand of strength during the year, together with the discharge rates indicating the permanent disability caused by them:

	Syphilis and results.		Gonorrhea.		Chancroids.		Total.	
	Admissions.	Discharges.	Admissions.	Discharges.	Admissions.	Discharges.	Admissions.	Discharges.
Troops in the United States	19.62	5.46	102.42	1.64	33.35	0.19	155.39	7.29
Volunteers in Philippines	10.05	.35	45.78	.03	24.11	.03	79.94	.41
Regulars in Philippines	14.75	.73	77.67	.23	46.46	.....	138.88	.96
Troops in China	9.24	.....	99.13	.....	65.23	.....	173.60	.....
Troops in Cuba	26.47	2.53	111.85	1.50	52.36	.....	190.68	4.03
Troops in Porto Rico	44.03	.92	194.04	.92	129.81	.....	367.88	1.84
Total Army	15.83	1.73	78.69	.58	39.45	.05	133.97	2.36

Since the close of the calendar year, reports from the chief surgeon of the division of the Philippines show these diseases to have increased materially in their prevalence. In April, 1901, they constituted 20.42 per cent of the total sickness as compared with 8.97 per cent in September, 1900. The board of health of Manila has instituted measures for the control of these infections among the women of the town, including the segregation of prostitutes in a certain part of the city and a careful system of superintendence over them. Orders have been issued directing an inspection of the troops at regular intervals, with the intention of detecting all diseased soldiers and sending them to hospital for treatment. The carrying out of these orders for the examination of all enlisted men has added to the sick list many cases that would have otherwise been treated privately and not appeared on the sick reports. Los Banos on Laguna de Bay, which has hot springs closely resembling in composition those of the hot springs of Arkansas, has been selected as a suitable place for the treatment of syphilities, and some of these cases are now there undergoing treatment.

Similar efforts have been made in Cuba and Porto Rico to control these diseases.

In the report of an inspection of the hospital at Calamba, province of Laguna, dated February 24, 1901, Maj. L. M. Maus, surgeon, U. S.

Army, sanitary inspector of the division of the Philippines, states that although about 50 per cent of the troops in garrison at Calamba were affected with venereal diseases, only 15 cases were under treatment in hospital, some in quarters, while a large number of men treated themselves or went without medical care for the sake of preserving a clean medical record. He states that:

An examination system, with certificates, has been adopted for the women of the town, the examinations being conducted by Contract Surgeon Smith, but it has not appeared to lessen the evil. It is believed that the well women pass their certificates around to their less fortunate sisters during business hours, and hence the inefficiency of the system. The matter has attracted considerable official attention at Calamba, and the district commander has ordered the post commander to deport all women found diseased, the place of deportation and method of getting other corporations to accept them being left to the ingenuity of the commanding officers. So far nothing has been done in this regard, on account of the difficulties involved. The question is a serious one and should be solved without delay. So long as our troops remain stationed in small towns which are practically under the control of military authority, a thorough examination of public women should be required and the diseased ones sent to an improvised hospital supported by the town, until cured. Strict rules should be issued on this subject for the punishment of those who attempt to leave the hospital until pronounced well. Unless something is done immediately, from 20 to 40 per cent of troops stationed in provincial towns are liable to become incapacitated for military duty more or less from this cause.

ALCOHOLISM.

The admission rate for alcoholism in the Army as a whole during the year 1900 was 15.34 per thousand of strength, as compared with 14.49 in 1899 and with 28.67, the mean annual rate of the decade 1889–1898. Troops serving in the United States during the past year had 22.43 admissions per thousand of strength. The steady decrease of late years in the admissions for alcoholism among men of the Regular Army is a matter for congratulation. Military officers may be said to be unanimous in their opinion that this was mainly the result of the establishment of the post exchange or canteen at military posts. The following shows this gradual improvement: Mean annual admission rate of the decade ending with 1889, 56.68 per thousand of strength. Admission rate for 1889, 41.41; for 1890, 40.73; for 1891, 40.01; for 1892, 37.23; for 1893, 33.97; for 1894, 30.94; for 1895, 30.11; for 1896, 29.06, and for 1897, 27.86. In 1898 the altered conditions consequent on the Spanish-American war prevented further comparisons. There is less drunkenness among troops in active service than in a command doing garrison duty in times of peace. In the Philippines during the past year the admission rate for alcoholism among the Volunteers was 8.68, and for Regulars 12.41; for troops in China, 7.70. These statistics do not sustain the newspaper reports of drunkenness among the troops in the Philippines. In fact, medical officers report the habits of the enlisted men in the Philippines as very much the same as in the United States. Much of the evil effects of intemperance in the Philippines is attributed to the use of the native intoxicant, vino, which is a crudely distilled alcohol, causing rapid intoxication, which is readily recovered from when a moderate quantity is taken, but which, taken in excess, causes wild delirium and unconsciousness, and in habitual users induces a deterioration of the mental faculties.

A sample of this vino obtained from the factory when it was manufactured, was examined by Contract Surg. William Roberts, at the military hospital, Dagupan, P. I., and was found to contain 33 per

cent of alcohols belonging to the methyl and ethyl series, 11 per cent of the former and 22 per cent of the latter. Methyl alcohol constitutes the active poisonous agent of this mixture, and is derived from the juice of the nipa. The ethyl alcohol is produced by the fermentation of crude sugar added to the nipa juice, and is no more poisonous than the ordinary form of alcohol found in sherry wine or other grape juice fermentations. Vino is the first distillate of the fermented juice of the nipa plus cane sugar, and contains besides the methyl alcohol or wood spirit, traces of amyl, propyl, butyl, and other alcohols, the mixture being known under the common term fusel oil. It is always present in the first distillate of alcoholic liquors, and vino represents all that is bad in this respect.

INSANITY.

Of insanity 273 cases were reported, equivalent to an annual rate of 2.72 per thousand of strength. Of these cases 149, or somewhat more than one-half, were discharged from the service and sent to the Government Hospital for the Insane at Washington, D. C., for treatment. The remaining 124 cases were returned to duty at various periods after having been taken on the sick report. The admission rate in 1899 was 1.78, and the proportion of those sent to the Government Hospital formed 0.87 per thousand of the strength. The increase during the past year is explained by the nervous depression and homesickness among the relatively larger proportion of the strength of the Army serving in the Philippines. Twenty-three cases were reported from the home stations, equivalent to 1.38 per thousand of the strength; 3 cases from Porto Rico, also equivalent to 1.38 per 1,000 men; 14 cases from Cuba, equivalent to a rate of 1.61; 7 cases from China, equivalent to 3.60; 99 cases from the Regular troops in the Philippines, equivalent to 2.79, and 123 cases from the Volunteer troops in the Pacific islands, equivalent to a rate of 3.90.

DIARRHEAL DISEASES.

During the year 1897, when all the troops of the United States served at the home stations, the admission rate for diarrheal diseases was 73.77 per thousand of strength, with no death. Dysentery was a comparatively rare disease and seldom fatal. During the decade ended December 31, 1897, the mean annual rate of admissions was 91.06, and the death rate 0.06. In 1898, as a result of war service in Cuba, Porto Rico, and the Philippines, the admission rate rose to 388.62, and the increased gravity of the cases was manifested by a death rate of 1.45 per thousand of the strength. During the following year, 1899, the admission rate was 380.69, with a death rate of 2.14. During the past year the admission rate increased to 465.01 and the death rate to 6.47, on account of the relatively large proportion of the Army which was exposed to the causes of diarrheal and dysenteric diseases in the Division of the Philippines. Among troops serving in the United States the admission rate was only 96.57; in Porto Rico, 148.17, and in Cuba, 166.75, and the death rates in these commands were relatively small. But in the Philippines, among the regulars, the admission rate was 488.25, and among the volunteers, 736.05, while among the troops engaged in the dangerous campaign in China it rose to 1,266.54 per thousand of the strength. The heavy mortality rates occurred in

these commands. Among the Pacific Islands the death rate was 7.47 per thousand of strength; among the volunteers, 10.88, and among the troops of the China relief expedition, 15.92.

The following tabulation shows, in the various commands, the admission rate for acute and chronic dysentery and other diarrheal diseases, with the absolute number of cases, of discharges for disability, and of deaths referred to each of these headings. It is evident, however, from the large number of deaths attributed to diarrheal diseases other than dysentery that many cases of the latter disease must have been reported as diarrheas.

Location of troops and disease.	Admission rate per 1,000 of strength.	Number of cases.	Number of discharges.	Number of deaths.
United States:				
Dysentery—				
Acute	3.77	78	.....	.....
Chronic	3	62	17	3
Other diarrheal diseases	89.80	1,858	6	1
Total	96.57	1,998	23	4
Porto Rico:				
Dysentery—				
Acute	27.52	60	.....	1
Chronic	1.38	3	.....	1
Other diarrheal diseases	119.27	260	5	.....
Total	148.17	323	5	2
Cuba:				
Dysentery—				
Acute	30.61	266	1	5
Chronic	2.42	21	1	.....
Other diarrheal diseases	133.72	1,162	1	.....
Total	166.75	1,449	3	5
Philippine Islands:				
Regulars—				
Dysentery—				
Acute	74.82	2,652	5	69
Chronic	38.85	1,377	64	165
Other diarrheal diseases	374.58	13,278	34	31
Total	488.25	17,307	103	265
Volunteers—				
Dysentery—				
Acute	93.56	2,941	.....	136
Chronic	51.57	1,621	25	154
Other diarrheal diseases	590.92	18,575	16	52
Total	736.05	23,137	41	342
China:				
Dysentery—				
Acute	175.64	342	1	18
Chronic	49.30	96	4	13
Other diarrheal diseases	1,041.60	2,028	1	.....
Total	1,266.54	2,466	6	31
The Army:				
Dysentery—				
Acute	63.15	6,339	7	229
Chronic	31.68	3,180	111	336
Other diarrheal diseases	370.18	37,161	63	84
Total	465.01	46,680	181	649

PTOMAINE POISONING.

Two instances of ptomaine poisoning occurred in the Army since my last annual report. In one case the command affected was Company G, Twelfth Infantry, stationed at Bamban, Tarlac, P. I. Capt.

E. C. Poey, assistant surgeon, United States Volunteers, attributed the attack to certain cans of evaporated cream used in making a bread pudding for supper April 16, 1901. At 12.30 a. m., April 17, the first of the series of cases reported sick with headache, vomiting, diarrhea, muscular prostration, cold, clammy sweats, a rapid and feeble pulse, and violent cramps. By 3 a. m. there were several cases with similar symptoms. At noon 25 to 30 men were under treatment. Altogether about 40 men suffered. Many of the cases were very severe, but no death occurred.

In the other instance report was made from Fort McPherson, Ga., by Lieut. Charles C. Greer, assistant surgeon, United States Army, that on September 4, 1901, 175 men were added to the sick report suffering from ptomaine poisoning, probably due to the fact that the food used at supper and breakfast before the outbreak had been allowed to stand too long in certain metal containers. These were of a cheap variety, and had a seam around the bottom which could not be easily cleaned even when scrubbed with a stiff brush. The prevailing symptoms were nausea, vomiting, purging, severe abdominal pains, back ache, headache, fever (103° to 106° F.), rapid pulse, and general prostration. Twenty per cent of the cases were severe, and a few were extremely ill, but there was no death. Lieutenant Greer commended the hospital corps men for their efficient work during the two days of this trying ordeal.

DISEASES OF THE RESPIRATORY ORGANS.

Diseases of the respiratory organs among troops in the United States gave an admission rate of 76.48 and a death rate of 0.56 per thousand of strength, as compared with 202.34 and 1.47 in 1899, and with 102.21 and 0.69, respectively, the mean annual rates of the decade 1889–98.

Bronchitis gave a rate of 84.39 in the United States. The exposures of the troops during the active campaign in China caused a rate of 92.45, but in the islands this affection was infrequent, the rate in Cuba having been only 29.34, in Porto Rico 29.82, and in the Pacific islands, among the regulars 34.59 and among the volunteers 44.60.

Pneumonia, also, had its highest prevalence in the United States, 4.25 per thousand of strength, followed in China by a rate of 3.08, while in Cuba the rate was only 1.61, in Porto Rico 2.29, and in the Pacific islands 2.12 among the regulars and 2.61 among the volunteers. The death rate, however, from this disease was highest among the volunteer troops in the Philippines, 0.76 per thousand men, as compared with 0.25 among the regular troops serving with them and with 0.34 among the troops serving in the United States.

SPECIAL MEDICAL REPORTS RENDERED TO JUNE 30, 1901.

Name.	Rank.	Report.
Appel, D. M.	Major and surgeon	Pulmonary and laryngeal tuberculosis, clinical history. Pulmonary tuberculosis, 3 cases, thermographs only.
Arwine, Jas. T	Contract surgeon	Syphilis.
Ashford, B. K	First lieutenant and assistant surgeon.	Copy of chapter on "Uncinariosis" written for Dr. Cabot's work on blood analysis.
Banister, W. B	Major and surgeon	Report of the China relief expedition.
Barber, A. W	Contract surgeon	Smallpox at Fort D. A. Russell, Wyo.
Borden, W. C	Major and surgeon	Diphtheria.
Bradley, A. E	Captain and assistant surgeon.	Do.

Special medical reports rendered to June 30, 1901—Continued.

Name.	Rank.	Report.
Carr, L. C	Major and surgeon, volunteers.	Santiago as a yellow-fever center.
Cattermole, C. A	Captain and assistant surgeon, volunteers.	Vaccinia.
Curry, Jos. J	do	Diseases of the Philippines. Malta fever.[1]
Curtis, J. W	Contract surgeon	Smallpox at Tagudin, Philippines.
DeKrafft, S. C	Captain and assistant surgeon, volunteers.	Hæmoglobinuric fever.
DeMey, C. F	do	Beriberi.
DeNiedeman, Wm	Major and surgeon, volunteers.	Abscess of liver.
Dunshie, J. F	Contract surgeon	Yellow fever at Guanajay Barracks, Cuba.
Egan, P. R	Major and surgeon	Meat ration in the Tropics.[2]
Flagg, C. E. B	Captain and assistant surgeon.	Rubella. Secondary syphilis. Typhoid fever, 2 cases.
Frick, E. B	do	Value of blood examinations in obstetrics.
Girard, A. C	Lieutenant-colonel and deputy surgeon-general.	Report of autopsies made during August, September, October, November, and December, 1900. Report of autopsies made during, January, February, and March, 1901.
Godfrey, G. C. M	Captain and assistant surgeon.	Yellow fever at Pinar del Rio, Cuba. May, June, and July.
Gorgas, W. C	Major and surgeon	Report of the work of the sanitary department, Habana, Cuba, year of 1900.
Gregory, W. G	Contract surgeon	Tuberculosis.
Hoff, J. Van R	Major and surgeon	Annual report Department of Porto Rico, June 30, 1900.
Howard, D. C	Captain and assistant surgeon.	Scarlet fever.
Kelly, John P	Contract surgeon	Epidemic diseases on transport Kilpatrick.
Latimer, C. H	do	Report relative to insane cases treated at the First Reserve Hospital, Manila, P. I.
Mason, C. F	Captain and assistant surgeon.	Observations on diseases of the Tropics.
Morris, E. R	Major and surgeon	Primary dementia.
Owen, W. O	do	Paper entitled, "Does physical law apply to the human body."
Poey, E. C	Captain and assistant surgeon, volunteers.	Report on epidemic of gastro-enteritis at Bamban, Tarlac, P. I.
Raymond, H. I	Captain and assistant surgeon.	Chronic dysentery.
Raynor, W. J	Captain and assistant surgeon, volunteers.	Care of the feet in the Tropics.
Roberts, Wm	First lieutenant and assistant surgeon.	Report on the chemistry of vino.
Shockley, M. A. W	do	Smallpox at Fort Niobrara, Nebr.
Stearns, C. H	Captain and assistant surgeon, volunteers.	Pernicious malarial fever.
Stone, J. H	First lieutenant and assistant surgeon.	Typhus fever, sporadic case, Matanzas, Cuba. Myiosis, parasitic invasion of the nares.
Strong, R. P	do	Report of a case of infection with Balantidium coli. Report of a case of infection with Strongyloides intestinalis.
Stunkard, Thos. C	Contract surgeon	Paper on the general hospital, Presidio of San Francisco, Cal.
Tesson, L. S	Major and surgeon	Poikilocytosis.
Ward, J. M	Contract surgeon	Beriberi. General tuberculosis.
Waterhouse, S. M	First lieutenant and assistant surgeon.	Insanity. Pseudo-angina pectoris. Varioloid.
Whitney, W	Major and surgeon, volunteers.	Smallpox on transport Kilpatrick.
Wilcox, T. E	Major and surgeon	Typhoid fever.
Winne, C. K	do	Angio-neurotic gangrene.
Woodruff, C. E	do	Vaccination at Fort Riley, Kans.

[1] Published in the Boston Medical and Surgical Journal, February 21, 1901.
[2] Published in the Boston Medical and Surgical Journal, March 31, 1901.

BOARD FOR THE STUDY OF THE ETIOLOGY AND PREVENTION OF YELLOW FEVER.

In my last annual report I referred to the appointment of a board for the purpose of pursuing scientific investigation with reference to the acute infectious diseases prevailing on the island of Cuba. This board, consisting of Maj. Walter Reed, surgeon United States Army, and Contract Surgs. James Carroll, Aristides Agramonte, and Jesse W.

Lazear, United States Army, arrived at their station, Columbia Barracks, Quemados, Cuba, on June 25, 1900, and at once proceeded, under written instructions from this office, published in my last annual report, to the special study of questions relating to the causation and prevention of yellow fever.

Fortunately for the purpose of this board an epidemic of yellow fever which had begun in the adjacent town of Quemados, Cuba, during the latter part of the month of May was still prevailing, so that an opportunity was afforded for bacteriological and pathological observations in this disease. In the course of the investigations which were assiduously carried out by the members of the board during the months of July, August, and September, the results obtained, especially as relates to the mode of propagation of yellow fever by the bite of the mosquito, were such as to warrant their publication. For this purpose permission was given to Maj. Walter Reed, president of the board, to present a preliminary report at the meeting of the American Public Health Association held in Indianapolis, Ind., October 22–26, 1900.

In its experimental work during these months two of the members of the board suffered from yellow fever as the result of having been bitten by infected mosquitoes. Dr. Lazear was bitten September 13, 1900, became affected with yellow fever five days afterwards, and died September 25, 1900. Dr. Carroll was bitten August 27, 1900, and was removed to the yellow fever wards on September 1, 1900. He suffered from a severe attack of the disease, but fortunately recovered. The conclusions of the board in its preliminary report were, first, that the Bacillus icteroides (Sanarelli) stands in no causative relation to yellow fever, but when present should be considered as a secondary invader in this disease; second, that the mosquito serves as the intermediate host for the parasite of yellow fever.

As these observations, if confirmed, were of the highest importance in the future prevention of yellow fever, not only among our troops stationed on the Island of Cuba, but in our Atlantic seaports, the board was directed to continue its observations, especially along the same line of investigation.

With the approval of the military governor of the island, an experimental station was established and further observations undertaken by Major Reed and his associates. A small camp of non-immune young men, mostly belonging to the hospital corps, was formed in an open field about a mile from Quemados, Cuba. After this camp had been occupied long enough to show that yellow fever in its stage of incubation was not present, five of the men permitted themselves to be bitten by infected mosquitoes. In from 3 to 5 days each of these men became the subject of a well-defined attack of the disease and was sent to the yellow-fever hospital. In a second series of experiments, four non-immunes were injected with blood from yellow-fever patients. Each of these was attacked and sent to the fever hospital, while four of the men who had suffered an attack from infection transmitted by mosquitoes manifested no bad effect from a similar injection of yellow-fever blood. The mosquito-conveyed infection had given immunity from the disease. A third series of experiments was carried out to determine whether yellow fever can be conveyed by clothing and bedding which have been contaminated by contact with yellow-fever patients and their discharges. A small unventilated hut was built, its

interior well guarded against mosquitoes by wire screens. Dr. R. P. Cooke and two hospital corps men, all of them non-immunes, passed twenty consecutive nights in this hut, sleeping in contaminated sheets and blankets taken from the beds of yellow-fever patients in the Los Animas Hospital, of Habana, Cuba. After this a fresh stock of soiled articles, including pajamas, undershirts, and nightshirts, in addition to bedding, was obtained from the fever hospital and two non-immunes occupied the room for twenty-one nights. A third time this experiment was repeated by two non-immunes for twenty nights; yellow fever was not developed in any of these experiments. Meanwhile another small hut was constructed, well ventilated and with a wire screen extending from floor to ceiling in the middle, dividing it into two compartments. Every article before admission into this room was carefully disinfected by steam. Fifteen infected mosquitoes were set free in one compartment into which a non-immune hospital corps man entered and was bitten. Four days afterwards he was removed to the yellow-fever hospital. The other compartment was occupied for eighteen nights by two non-immunes whose health remained perfect. The conclusions drawn from these experiments were:

1. The mosquito—*Culex fasciatus*—serves as the intermediate host for the parasite of yellow fever.
2. Yellow fever is transmitted to the non-immune individual by means of the bite of the mosquito that has previously fed on the blood of those sick with this disease.
3. An interval of about twelve days or more after contamination appears to be necessary before the mosquito is capable of conveying the infection.
4. The bite of the mosquito at an earlier period after contamination does not appear to confer any immunity against a subsequent attack.
5. Yellow fever can also be experimentally produced by the subcutaneous injection of blood taken from the general circulation during the first and second days of the disease.
6. An attack of yellow fever, produced by the bite of the mosquito, confers immunity against the subsequent injection of the blood of an individual suffering from the non-experimental form of this disease.
7. The period of incubation in 13 cases of experimental yellow fever has varied from forty-one hours to five days and seventeen hours.
8. Yellow fever is not conveyed by fomites, and hence disinfection of articles of clothing, bedding, or merchandise, supposedly contaminated by contact with those sick with this disease, is unnecessary.
9. A house may be said to be infected with yellow fever only when there are present within its walls contaminated mosquitoes capable of conveying the parasite of this disease.
10. The spread of yellow fever can be most effectually controlled by measures directed to the destruction of mosquitoes and the protection of the sick against the bites of these insects.
11. While the mode of propagation of yellow fever has now been definitely determined, the specific cause of this disease remains to be discovered.

Subsequent to this, and in continuation of the same line of experimental work, Major Reed and his assistants succeeded in inducing attacks of yellow fever in four other persons by means of the bites of mosquitoes that had previously bitten yellow-fever patients, thus making a total of 12 cases produced by the bites of mosquitoes. These latter cases were of special importance as showing the length of time during which the mosquito may remain capable of conveying the disease. In three of the cases the intervening period between the contamination of the insect and the production of the disease was thirty-nine, fifty-one, and fifty-seven days, respectively, thus offering an explanation of the fact that the contagion of yellow fever may cling several months to a building that has been vacated by its occupants,

or to the infected area of a town, even though the latter has been entirely depopulated.

Upon the recommendation of Major Reed further work at the experimental sanitary station near Quemados was discontinued at the end of February, 1901, and the members of the board were ordered to return to their proper station in this city, in order to give special attention to the search for the yellow-fever germ in the bodies of the infected mosquitoes which had been killed and preserved at various dates after their contamination. This investigation is still being carried on in the laboratory of the army medical school. I am very glad to be able to report that recovery took place in all patients the subjects of experimentation.

The importance and far-reaching consequences of the observations made by Major Reed and his associates at Quemados, Cuba, can hardly be overestimated. For the first time in the history of this widely prevalent tropical disease we are in possession of knowledge with regard to the manner of its propagation which will enable us, I believe, not only to check its ravages, but to effectually stamp it out whenever it may appear in any of our garrisons or cities.

With the view of promptly arresting the spread of the disease among our troops, a circular was submitted for my approval by the chief surgeon, and was published as Circular No. 5, of 1901, from the headquarters, Department of Cuba. (See p. 145.)

Already the sanitary measures which have been put in force by the health authorities in the city of Habana, based on the work of Major Reed and his associates, have resulted in absolutely ridding the city of yellow fever for the first time in more than one hundred and forty years.

Extracts from the Preliminary Note of the Board for the Study of the Etiology and Prevention of Yellow Fever.

The first part of this preliminary note will deal with the results of blood cultures during life and of cultures taken from yellow-fever cadavers, reserving for the second part a consideration of the mosquito as instrumental in the propagation o yellow fever, with observations based on the biting of non-immune human beings by mosquitoes which had fed on patients sick with yellow fever at various intervals prior to the biting.

In prosecuting the first part of our work we isolated a variety of bacteria, but of this we do not propose to speak at present. It will suffice for our purpose if we state the results as regards the finding of *Bacillus icteroides*, leaving the mention of other bacteria to our detailed report.

The cases studied during the Quemados epidemic had been diagnosed by a board of physicians, selected largely by reason of their familiarity with yellow fever. This board consisted of Drs. Nicolo Silverio, Manuel Herera, Eduardo Angles, and Acting Asst. Surg. Roger P. Ames, and Jesse W. Lazear, United States Army.

Those studied in Habana were patients in Las Animas Hospital, and had been diagnosed as such by a board of distinguished practitioners of that city.

An examination of Table I will show the character of the attacks. The milder cases studied, few in number, were attended with jaundice and albumin in the urine.

Bacillus icteroides (Sanarelli) as the cause of yellow fever.—The claim of Sanarelli for the specific character of *B. icteroides* as the causative agent in yellow fever has excited such wide attention since the publication of his observation, that it seemed to us of the first importance to give our undivided attention to the isolation of this microorganism from the blood of those sick with yellow fever, and from the blood and organs of yellow-fever cadavers.

A. *Cultures taken from the blood during life.*—The method followed was that ordinarily used in an attempt to isolate bacteria from the circulating blood, viz, from a vein at the bend of the elbow a sufficient quantity of blood was taken with an hypodermic syringe, made sterile by boiling, and after careful cleansing of the skin with

soap and water, followed by equal parts of absolute alcohol and ether, and 1:2000 bichlorid solution.

Exceptionally, the blood withdrawn was plated on agar; but as a rule it was immediately transferred to sterile bouillon tubes (10 cubic centimeters) in quantities of 0.5 cubic centimeter to each of several tubes. These were then incubated at from 35° to 37° C. for a period of one week. They were examined daily, and if growth was observed plates were made in agar or gelatin, or both, and the colonies carefully studied by transference to ordinary laboratory media.

Eighteen cases have thus been carefully studied; of these 11 were designated as "severe" cases of yellow fever, with 4 deaths; 3 as "well-marked" cases, with no deaths; and 4 as "mild" cases, with no deaths.

From these 18 cases blood cultures were made, as shown in the following table:

TABLE I.—*Blood cultures during life.*

Day of disease.	Character of attack.	Number of cultures.	Number of bouillon tubes inoculated.	Bacillus icteroides.
First	Severe	3	[1]4	Negative.
Do	Well-marked	1	4	Do.
Do	Mild	1	3	Do.
Second	Severe	6	18	Do.
Do	Well-marked	1	2	Do.
Do	Mild	1	[2]3	Do.
Third	Severe	7	[2]18	Do.
Do	Mild	2	4	Do.
Fourth	Severe	5	14	Do.
Do	Well-marked	2	6	Do.
Do	Mild	1	1	Do.
Fifth	Severe	5	[1]12	Do.
Do	Well-marked	1	3	Do.
Do	Mild	1	1	Do.
Sixth	Severe	1	6	Do.
Do	Well-marked	1	2	Do.
Seventh	Severe	1	2	Do.
Do	Well-marked	1	2	Do.
Eighth	Severe	2	6	Do.
Do	Well-marked	1	2	Do.
Ninth	Severe	1	2	Do.

[1] 3 agar plates. [2] 6 agar plates.

Number of cultures	48
Number of bouillon tubes inoculated	115
Number of agar plates	18

It will be seen that of 48 separate cultures made from the blood on various days of the disease and representing 115 bouillon inoculations and 18 agar plates we failed to find *Bacillus icteroides* in any of our tubes or plates.

The results of cultures taken in 18 cases of unmistakable yellow fever, on various days of the disease, and in some cases on every day from the onset to death or recovery, would seem to exclude the presence of *Bacillus icteroides* in the blood of these cases during life.

We have already stated that we will reserve for a later report a description of the bacteria isolated from the blood in these cases. We now remark that but few organisms were obtained, and that as a rule our blood-cultures gave no growth whatever.

B. *Cultures from yellow fever cadavers.*—We tried to obtain autopsies very soon after death, and sometimes succeeded in doing so. Tubes containing about 10 cubic centimeters of flesh-peptone bouillon were generally used for the first inoculation direct from the blood and organs. As soon as the laboratory was reached agar plates were made from these inoculated bouillon tubes, the former as well as the latter being then incubated at from 35° to 37° C. In nearly every case gelatin plates were also made from the recently inoculated bouillon tubes and kept at a temperature of 19° to 20° C.

If colonies were found in the agar or gelatin plates, on the following days the corresponding bouillon tubes were also plated on agar and gelatin. The bacteria thus found in our plates were carefully isolated and studied upon the usual nutritive media, so as to enable us to identify them, if possible. We will here content ourselves with giving the results as regards the presence of *Bacillus icteroides* only:

TABLE II.

No. of case.	Day of disease.	Time of autopsy (hours after death).	Source of culture.	Bacillus icteroides.
1	Seventh	2	Blood, liver, spleen, kidney	Negative.
2	Sixth	13	.....do	Do.
3	Fourth	8	.....do	Do.
4	Eighth	2	Abdominal cavity, blood, liver, spleen, kidney, bile, duodenum.	Do.
5	Fourth	4	Blood, liver, spleen, kidney, bile, duodenum	Do
6	Sixth	6½	Abdominal cavity, blood, pericardial fluid, lung, spleen, kidney, liver, bile, duodenum.	Do.
7	.....do	¾	Blood, lung, liver, spleen, kidney, bile, jejunum	Do.
8	.....do	¾	Blood, lung, liver, spleen, kidney, urine, small intestine ..	Do.
9	Fourth	2	Liver, spleen, small intestine	Do.
10	Fifth	7	Liver, kidney, spleen, small intestine	Do.
11	Third.....	¾	Liver, kidney, spleen	Do.

Our failure to isolate *Bacillus icteroides* in these 11 autopsies of yellow fever patients was a result which we had not anticipated. One of us (Agramonte), who at Santiago, Cuba, during the epidemic of 1898, succeeded in finding *Bacillus icteroides* in 33 per cent of his autopsies, has been much surprised at the absence of this bacillus in cultures from cadavers sectioned in or near Habana during the present year. In 2 of the 11 cases we had reason to believe that from the appearance of colonies seen in gelatin plates we would be able to isolate *Bacillus icteroides*. These colonies, however, when transferred to other media and carefully studied, did not prove to be this bacillus. We wonder whether other observers have occasionally relied upon the appearance of colonies in gelatin plates without further study. We only mention this as a possible explanation of the large percentage of positive results recorded by some observers.

Portier, of New Orleans, La., only succeeded, however, in isolating *Bacillus icteroides* in 3 out of 51 autopsies. (Journal of American Medical Association, April 16, 1898.)

Lutz (Revista d'Igiene e Sanita Publica, xi, No. 13, July, 1900, pp. 474–475) says as the result of his extensive observations on yellow fever that *Bacillus icteroides* can not be found by present laboratory methods in more than half of the cases of yellow fever, and that when present the colonies are few in number. It is possible that our future autopsies may give more favorable results as regards *Bacillus icteroides*.

The mosquito as the host of the parasite of yellow fever.—Having failed to isolate *Bacillus icteroides*, either from the blood during life or from the blood and organs of cadavers, two courses of procedure in our further investigations appeared to be deserving of attention, viz, first, a careful study of the intestinal flora in yellow fever in comparison with the bacteria that we might isolate from the intestinal canal of healthy individuals in this vicinity, or those sick with other diseases; or, secondly, to give our attention to the theory of the propagation of yellow fever by means of the mosquito—a theory first advanced and ingeniously discussed by Dr. Carlos J. Finlay, of Habana, in 1881. (Anales de la Real Academia, vol. xviii, 1881, pp. 147–169.)

We were influenced to take up the second line of investigation by reason of the well-known facts connected with the epidemiology of this disease, and, of course, by the brilliant work of Ross and the Italian observers in connection with the theory of the propagation of malaria by the mosquito.

We were also very much impressed by the valuable observations made at Orwood and Taylor, Miss., during the year 1898, by Surgeon Henry R. Carter, United States Marine-Hospital Service. (A note on the interval between infecting and secondary cases of yellow fever, etc., reprint from New Orleans Medical Journal, May, 1900.) We do not believe that sufficient importance has been accorded these painstaking and valuable data. We observe that the members of the yellow fever commission of the Liverpool School of Tropical Medicine, Drs. Durham and Meyers, to whom we had the pleasure of submitting Carter's observations, have been equally impressed by their importance. (British Medical Journal, September 8, 1900, pp. 656–657.)

The circumstances under which Carter worked were favorable for recording with considerable accuracy the interval between the time of arrival of infected cases in isolated farm houses and the occurrence of secondary cases in these houses. According to Carter, "the period from the first (infecting) case to the first group of cases infected at these houses is generally from two to three weeks."

The houses having now become infected, susceptible individuals thereafter visiting

the houses for a few hours fall sick with the disease in the usual period of incubation, one to seven days.

Other observations made by us since our arrival confirmed Carter's conclusions, thus pointing, as it seemed to us, to the presence of an intermediate host, such as the mosquito, which having taken the parasite into its stomach soon after the entrance of the patient into the non-infected house, was able after a certain interval to reconvey the infecting agent to other individuals, thereby converting a non-infected house into an "infected" house. This interval would appear to be from nine to sixteen days (allowing for the period of incubation), which agrees fairly closely with the time required for the passage of the malarial parasite from the stomach of the mosquito to its salivary glands.

In view of the foregoing observations, we concluded to test the theory of Finlay on human beings. According to this author's observation of numerous inoculations in 90 individuals, the applications of one or two contaminated mosquitoes is not dangerous, but followed in about 18 per cent by an attack of what he considers to be very benign yellow fever at most.

We here desire to express our sincere thanks to Dr. Finlay, who accorded us a most courteous interview and has gladly placed at our disposal his several publications relating to yellow fever during the past nineteen years, and also for ova of the variety of mosquito with which he had made his several inoculations. An important observation to be here recorded is that, according to Finlay's statement, thirty days prior to our visit these ova had been deposited by a female just at the edge of the water in a small basin, whose contents had been allowed to slightly evaporate, so that these ova were at the time of our visit entirely above contact with the water. Notwithstanding this long interval after deposition they were promptly converted into the larval stage after a short period by raising the water in the basin.

With the mosquitoes thus obtained we have been able to conduct our experiments. Specimens of this mosquito forwarded to Mr. L. O. Howard, entomologist, Department of Agriculture, Washington, D. C., were kindly identified as *Culex fasciatus*, Fabr.

In this preliminary note we have not space to refer at length to the various interesting contributions made by Finlay to the mosquito theory for the propagation of yellow fever. In addition to the paper already quoted, his most important contributions to this theory are to be found in the articles designated as follows: Estadistica de las Inoculaciones con mosquitos contaminados, etc., reprint, Habana, 1891; Fiebre Amarilla, Estudio Clinico Patologico y Etiologico, reprint, Habana, 1895; and Yellow Fever Immunity—Modes of Propagation—Mosquito Theory, Eighth Congress of International Hygiene and Demography, Budapest, 1894.

His present views on this subject may be stated in his own language:

"First, reproduction of the disease, in a mild form, within five to twenty-five days after having applied contaminated mosquitoes to susceptible subjects. Second, partial or complete immunity against yellow fever obtained even when no pathogenous manifestation had followed these inoculations." (Medical Record, vol. 55, No. 21, May 27, 1899.)

Without reviewing the cases regarded as mild forms by the author of this theory, we believe that he has not as yet succeeded in reproducing a well-marked attack of yellow fever, attended with albumin and jaundice, within the period of incubation of the disease, and in which all other sources of infection could be excluded.

The experiments made by us on 11 non-immune individuals are embraced in Table III, which should be carefully studied. The mosquito used in all cases was *Culex fasciatus*, Fabr.

TABLE III.—*Inoculation on non-immune individuals through the bite of mosquitoes (Culex fasciatus.)*

No. of case.	Age.	Nativity.	Date of inoculation.	Character of attack.	Number of patients bitten.	Day of disease.	Time between infection of mosquito and inoculation.	Number of mosquitoes.	Result.
							Days.		
1	.....	U.S.....	Aug. 11	Mild.....	1	7th	5	1	Negative.
2	.....	U.S.....do...		Very mild	1	5th	5	1	Do.
3	24	U.S.....	Aug. 12	.....do	1	5th	6	1	Do.
4	20	U.S.....do....		.....do	1	5th	6	1	Do.
5	24	U.S.....	Aug. 14	.....do	1	5th	8	1	Do.
6	34	U.S.....	Aug. 16	.....do	1	5th	10	1	Do.
7	22	U.S.....	Aug. 18	Severe.....	1	2d	3	1	Do.
8	20	U.S.....	Aug. 19	Very mild	1	5th	13	2	Do.
				Severe.....	1	1st.....	3		
				Fatal	1	2d	6		
9	28	U.S.....	Aug. 25	Mild.....	1	1st.....	4	1	Do.
				Severe.....	1	2d	2		
				.....do	1	2d	12		
10	46	Eng	Aug. 27	Mild.....	1	1st.....	6	1	Positive.[1]
				Severe.....	1	2d	4		
				Mild.....	1	2d	2		
				Fatal	1	2d	12		
				Mild.....	2	2d	4, 10	1	
				Severe.....	2	2d, 9th	2, 8		
				.....do	3	1st, 2d, 2d .	2, 8, 16	1	
11	24	U.S.....	Aug. 31	Mild.....	2	1st, 2d.....	6, 10		Positive.[2]
				Fatal	1	2d	12		
				Severe.....	1	1st.....	2	1	
				Mild.....	3	1st, 2d, 2d .	4, 6, 10		
				Severe.....	3	All on 1st.	2, 4, 8	1	
				Mild.....	1	2d	6		

[1] Severe attack of yellow fever.

[2] Well-marked attack of yellow fever.

It will be seen that we record 9 negative and 2 positive results. It is, we think, important to observe that of the 9 failures to infect, the time elapsing between the biting of the mosquito and the inoculation of the healthy subject varied in 7 cases from two to eight days (Nos. 1, 2, 3, 4, 5, 7, and 9), and in the remaining 2 from ten to thirteen days (Nos. 6 and 8).

Five individuals out of the nine who failed to show any result (Nos. 2, 3, 4, 5, and 6) were inoculated by mosquitoes that had bitten very mild cases of yellow fever on the fifth day of the disease, and one individual by a mosquito that had bitten a mild case of yellow fever on the seventh day of the disease. (This latter patient was discharged from the hospital three days later.) To this fact may possibly be attributed the negative results. Of the remaining 3 negative cases (Nos. 7, 8, and 9), and which had been inoculated by mosquitoes that had bitten severe cases of the disease, the interval between the bite and the inoculation varied from two to six days.

In the 2 cases (Nos. 6 and 8) where the interval was respectively ten and thirteen days, the inoculations had been made with mosquitoes that had bitten very mild cases of yellow fever on the fifth day of the attack. No. 8 was also bitten by a mosquito which had been infected by a severe case of yellow fever three days before.

We refrain from commenting further at this time upon the 9 negative cases, preferring to record the results thus obtained rather than to indulge in speculation.

Of the two cases which we have recorded as positive in Table III, we now propose to speak at greater length.

CASE 10.

Dr. James Carroll, acting assistant surgeon, United States Army, a member of this board, was bitten at 2 p. m. August 27, 1900, by *Culex fasciatus*. This particular mosquito had bitten a severe case of yellow fever on the second day of the disease twelve days before; a mild case of yellow fever on the first day of the attack six days preceding; a severe case of yellow fever on the second day of the attack four days before, and a mild case of yellow fever on the second day of attack two days before inoculation.

Dr. Carroll remained well until the afternoon of the 29th, when he states that he felt tired, and for this reason, when on a visit to Las Animas Hospital the same afternoon (29th) some time between 4 and 6 p. m., after visiting a few patients, he left

the wards and waited outside on the porch, while his companions remained in the wards.

August 30.—During the afternoon, although not feeling well, Dr. Carroll visited La Playa, about 1½ miles from Columbia Barracks, and took a sea bath.

August 31.—Dr. Carroll realized that he was sick and that he had fever, although he refrained from taking his temperature, but did visit the laboratory, distant about 140 yards, for the purpose of examining his blood for the malarial parasite. The examination was negative. During the afternoon he was compelled to take to his bed. At 7 p. m. temperature was 102° F. He had no headache or backache; only a sense of great lassitude. His eyes were injected and his face suffused.

September 1.—At 7 a. m. his temperature was 102°. Blood was again carefully examined by Dr. Lazear with negative result. At 11 a. m. temperature was 102°.

The case having been diagnosed as yellow fever, Dr. Carroll was at noon removed to the yellow fever wards. At 9 p. m. temperature was 102.8°, pulse 90; at 12 o'clock midnight temperature 103.4°, pulse 84.

September 2.—At 3 a. m. temperature was 103.6°, pulse 80. A trace of albumin was now found in the urine. The subsequent history of the case was one of severe yellow fellow. Jaundice appeared on September 3.

The accompanying chart, No. 1, contains all the necessary data.

CASE 11.

X Y, aged 24, white, American, a resident of the military reservation of Columbia Barracks, was bitten during the forenoon of August 31, 1900, by the same mosquito that had bitten case 10 (Dr. Carroll) 4 days before, and which in the meantime had bitten a mild case of yellow fever (first day) 2 days before being applied to X Y.

X Y was also bitten by a second mosquito that had been applied to a fatal case of yellow fever (second day) 12 days before; and to two mild cases (second day) 4 and 10 days previously; also, by a third mosquito that had bitten a fatal case of yellow fever (second day) 12 days before; a severe case (first day) 2 days before, and three mild cases (first, second, and second day) 4, 6, and 10 days before; finally by a fourth mosquito that had bitten three severe cases of yellow fever (all on first day) 2, 4, and 8 days previously, and one mild case (second day) 6 days before. (Vide Table III.)

It will be seen that X Y was bitten by four mosquitoes, two of which had bitten severe (fatal) cases of yellow fever 12 days previously; one of which had bitten a severe case (second day) 16 days before; and one which had bitten a severe case 8 days before.

X Y began to experience a sense of dizziness and disinclination to work. This was just 5 days from the time of the mosquito inoculation; twenty-four hours later he was still dizzy and light headed in attempting to move about. During the afternoon (sixth day after inoculation) he had chilly sensations, followed by fever and restlessness during the night.

On the following day (seventh day after inoculation), 8 a. m., temperature 102.8° F., his eyes were slightly injected and his face suffused. The patient was removed to the yellow fever wards; at 9 a. m. temperature was 103° F., pulse, 66. A trace of albumin was found in the urine during the afternoon (third day of the attack). This increased during the following days. The conjunctivæ were slightly jaundiced on the fourth day of the disease, which was more distinct and could be plainly seen on the anterior aspect of the chest on the fifth and following days. Bleeding from the gums was noticed on the third and subsequent days after admission. Repeated examinations of the blood failed to show any malarial parasites.

The course of the fever, the appearance of albumin in the urine, with jaundice and hemorrhage of the gums, together with the slow pulse, all pointed distinctly to the diagnosis of yellow fever. His attending physician, Dr. Roger P. Ames, United States Army, an expert in the diagnosis and treatment of this disease, did not hesitate to diagnose X Y's attack as one of "well-pronounced yellow fever." Dr. Ames was not cognizant of the method of inoculation in this case. (Vide Chart II.)

We invite attention to the fact that from August 17 to October 13, a period of fifty-seven days, only three cases of yellow fever have occurred at Columbia Barracks among a population of 1,400 non-immune Americans, and we consider it very important to note that two of these had been bitten within five days of the commencement of their attacks by contaminated mosquitoes.

We will now briefly give the history of the third case of yellow fever that has occurred at Columbia Barracks during the period August 17 to October 13, 1900.

In the light of cases 10 and 11, we consider this case of sufficient importance to be here included, especially as it is one that might be possibly designated as a case of accidental infection by a mosquito.

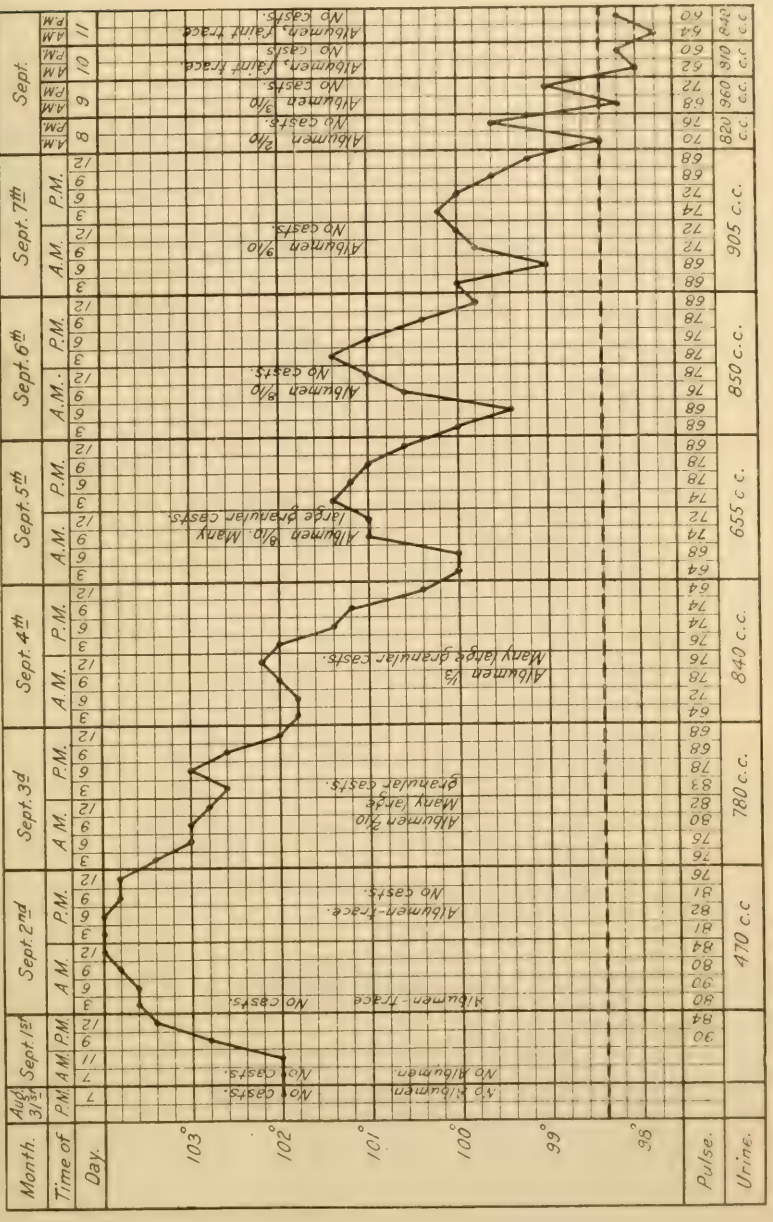
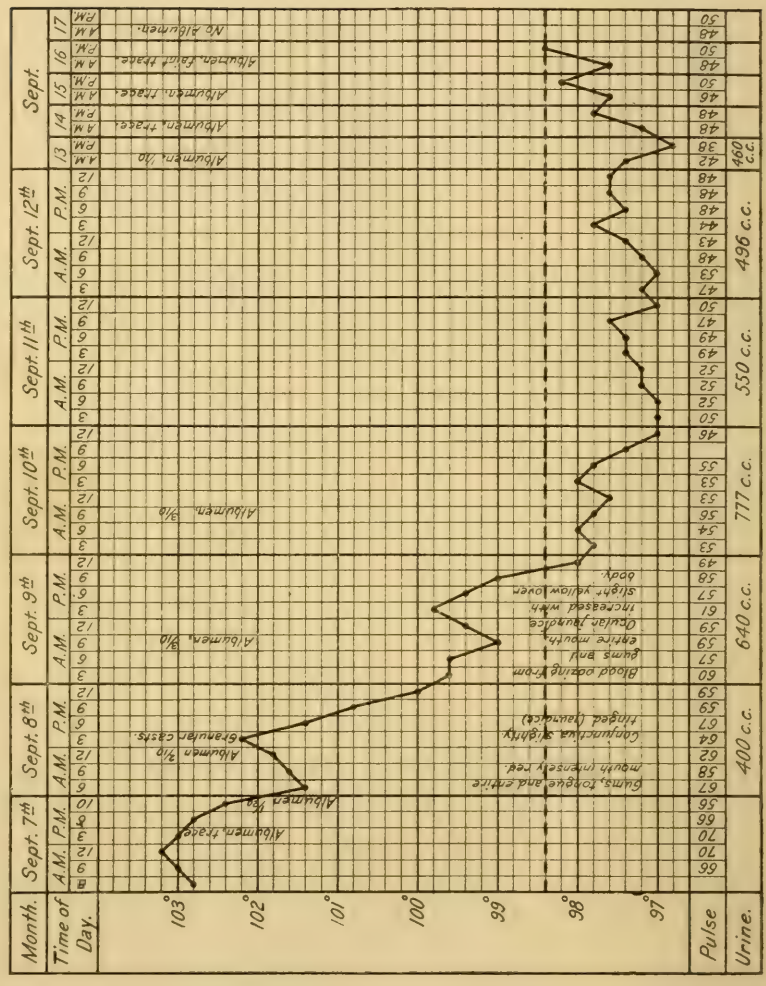


CHART I.—*Yellow fever following, within the usual period of incubation, the bite of an infected mosquito (Culex fasciatus).*

CHART II.—*Yellow fever following, within the usual period of incubation, the bite of an infected mosquito (Culex fasciatus).*



CASE 3.

Dr. Jesse W. Lazear, acting assistant surgeon, United States Army, a member of this board, was bitten on August 16, 1900 (case 3, Table III), by a mosquito (*Culex fasciatus*), which ten days previously had been contaminated by biting a very mild case of yellow fever (fifth day). No appreciable disturbance of health followed this inoculation.

On September 13, 1900 (forenoon), Dr. Lazear, while on a visit to Las Animas Hospital, and while collecting blood from yellow fever patients for study, was bitten by a *Culex* mosquito (species undetermined). As Dr. Lazear had been previously bitten by a contaminated insect without effect, he deliberately allowed this particular mosquito, which had settled on the back of his hand, to remain until it had satisfied its hunger.

On the evening of September 18, five days after the bite, Dr. Lazear complained of feeling "out of sorts," and had a chill at 8 p. m.

On September 19, 12 o'clock noon, his temperature was 102.4°, pulse 112; his eyes were injected and his face suffused. At 3 p. m. temperature was 103.4°, pulse 104; 6 p. m., temperature 103.8°, and pulse 106; albumin appeared in the urine. Jaundice appeared on the third day. The subsequent history of this case was one of progressive and fatal yellow fever, the death of our much-lamented colleague having occurred on the evening of September 25, 1900.

As Dr. Lazear was bitten by a mosquito while present in the wards of the yellow-fever hospital, one must at least admit the possibility of this insect's contamination by a previous bite of a yellow-fever patient. This case of accidental infection can not fail to be of interest in connection with cases 10 and 11.

For ourselves, we have been profoundly impressed with the mode of infection and with the results that followed the bite of the mosquito in these three cases. Our results would appear to throw new light on Carter's observations in Mississippi as to the period required between the introduction of the first (infecting) case and the occurrence of secondary cases of yellow fever.

Since we here, for the first time, record a case in which a typical attack of yellow fever has followed the bite of an infected mosquito, within the usual period of incubation of the disease, and in which other sources of infection can be excluded, we feel confident that the publication of these observations must excite renewed interest in the mosquito theory of the propagation of yellow fever as first proposed by Finlay.

From our study thus far of yellow fever, we draw the following conclusions:

1. *Bacillus icteroides* (Sanarelli) stands in no causative relation to yellow fever, but, when present, should be considered as a secondary invader in this disease.
2. The mosquito serves as the intermediate host for the parasite of yellow fever.

The second report submitted by the board on the etiology of yellow fever was, with my approval, read at the Pan-American Medical Congress held in Habana, Cuba, February 4–7, 1901.

THE ETIOLOGY OF YELLOW FEVER, BY MAJ. WALTER REED, SURGEON, UNITED STATES ARMY, JAMES CARROLL, AND ARISTIDES AGRAMONTE, ACTING ASSISTANT SURGEONS, UNITED STATES ARMY.

Since the publication of our preliminary note we have continued our investigations, especially as regards the means by which yellow fever is propagated from individual to individual, and as to the manner in which houses become infected with the contagium of this disease. The results already obtained are so positive and striking that, with the permission of Surgeon-General Sternberg, we have concluded to present to this Congress an additional note, in which we will record these later observations. We desire to here express our sincere thanks to the military governor of the island of Cuba, Maj. Gen. Leonard Wood, United States Volunteers, without whose approval and assistance these observations could not have been carried out.

In order to exercise perfect control over the movements of those individuals who were to be subjected to experimentation and to avoid any other possible source of infection, a location was selected in an open and uncultivated field, about 1 mile from the town of Quemados, Cuba. Here an experimental sanitary station was established under the complete control of the senior member of this board. This station was named Camp Lazear, in honor of our late colleague, Dr. Jesse W. Lazear, acting assistant surgeon, United States Army, who died of yellow fever while courageously investigating the causation of this disease. The site selected was well

drained, freely exposed to sunlight and winds, and from every point of view satisfactory for the purposes intended.

The personnel of this camp consisted of 2 medical officers, Dr. Roger P. Ames, acting assistant surgeon, United States Army, an immune, in immediate charge; Dr. R. P. Cooke, acting assistant surgeon, United States Army, non-immune; 1 acting hospital steward, an immune; 9 privates of the hospital corps, 1 of whom was immune, and 1 immune ambulance driver.

For the quartering of this detachment and of such non-immune individuals as should be received for experimentation, hospital tents, properly floored, were provided. These were placed at a distance of about 20 feet from each other, and were numbered 1 to 7, respectively.

Camp Lazear was established November 20, 1900, and from this date was strictly quarantined, no one being permitted to leave or enter camp except the 3 immune members of the detachment and the members of the board. Supplies were drawn chiefly from Columbia Barracks, and for this purpose a conveyance under the control of an immune acting hospital steward and having an immune driver was used.

A few Spanish immigrants recently arrived at the port of Habana, were received at Camp Lazear from time to time, while these observations were being carried out. A non-immune person, having once left this camp, was not permitted to return to it under any circumstances whatever.

The temperature and pulse of all non-immune residents were carefully recorded three times a day. Under these circumstances any infected individual entering the camp could be promptly detected and removed. As a matter of fact only two persons, not the subject of experimentation, developed any rise of temperature; one, a Spanish immigrant, with probable commencing pulmonary tuberculosis, who was discharged at the end of three days, and the other, a Spanish immigrant, who developed a temperature of 102.6° F. on the afternoon of his fourth day in camp. He was at once removed with his entire bedding and baggage and placed in the receiving ward at Columbia Barracks. His fever, which was marked by daily intermissions for three days, subsided upon the administration of cathartics and enemata. His attack was considered to be due to intestinal irritation. He was not permitted, however, to return to the camp.

No non-immune resident was subjected to inoculation who had not passed in this camp the full period of incubation of yellow fever, with one exception, to be hereinafter mentioned.

I. Having thus sufficiently indicated the environment of Camp Lazear and the conditions under which its residents lived, we will now proceed to a narration of the observations thus far made at this experimental station. At the time these inoculations were begun the several tents were occupied as follows: Tent No. 1 by 1 immune and 1 non-immune; No. 2 by 1 immune and 2 non-immunes; No. 3 by 2 immunes; No. 4 by 3 non-immunes; No. 5 by 3 non-immunes; No. 6 by 2 non-immunes, and No. 7 by 1 non-immune.

For the purpose of experimentation subjects were selected as follows: From Tent No. 2, 2 non-immunes, and from Tent No. 3, 3 non-immunes. Later 1 non-immune in Tent No. 6 was also designated for inoculation.

Case 1.[1]—Private John R. Kissinger, Hospital Corps, United States Army, aged 23, a non-immune, occupant of Tent No. 2, with his full consent, was bitten at 10.30 a. m., November 20, 1900, by a mosquito (*C. fasciatus*) that had bitten a severe case of yellow fever on the fifth day, eleven days previously; another severe case, on the third day, six days before, and a third severe case on the third day, three days before. As Kissinger had not absented himself from Columbia Barracks for a period of more than thirty days, it was considered safe to inoculate him without waiting for his period of incubation to pass.

November 23, 1900, Kissinger was again bitten by the same mosquito. The result of both inoculations was negative. The mosquito, therefore, was incapable of conveying any infection on the eleventh or fourteenth day after it had bitten a severe case of yellow fever on the third day of the disease. This insect had been kept at ordinary room temperature and died November 26, 1900.

December 5, 1900, at 2 p. m., twelve days after the last inoculation, Kissinger was again bitten by five mosquitoes (*C. fasciatus*), two of which had bitten fatal cases of yellow fever on the second day, fifteen days before; one a severe case on the second day, nineteen days previously, and two a mild case on the third day, twenty-one days before.

The record of temperature and pulse, taken every three hours, following this inoc-

[1] This was the first successful inoculation at Camp Lazear, and is therefore designated Case No. 1.

CAMP LAZEAR, THE EXPERIMENTAL SANITARY STATION NEAR QUEMADOS, CUBA.

"INFECTED BEDDING BUILDING" AND "MOSQUITO BUILDING," CAMP LAZEAR, NEAR QUEMADOS, CUBA

ulation, showed that the subject remained in his usual state of health during the following three days, except that on December 8, on the third day, Kissinger had slight vertigo, upon rising, which soon passed away. At 4.30 p. m.—commencement of fourth day—he complained of frontal headache; otherwise he felt well and partook of supper with appetite; at 9 p. m., temperature 98.4° F., pulse 90; at 11.30 p. m., he awoke with a chill, temperature 100° F., pulse 90; he complained of severe frontal headache and backache; his eyes were injected and his face suffused. December 9, at 3 a. m., his temperature was 102° F., pulse 102; he had violent headache and backache with nausea and vomiting. He was then removed to the yellow-fever wards. His subsequent history was that of a case of yellow fever of moderate severity. Albumin appeared in the urine on the fourth day, increased to one-fifth by volume on the sixth day and disappeared on December 22. Granular casts were present in considerable numbers from the fourth to the eighth day. The conjunctivæ were jaundiced on the third day. The diagnosis of yellow fever in this case was made by Drs. Juan Guitéras, Carlos Finlay, W. C. Gorgas, and A. Diaz Albertini, the board of yellow fever experts of the city of Habana, who saw the patient on several occasions during his illness. (See Chart III.) The period of incubation in this case was 3 days 9½ hours.

Case 3.—John J. Moran, aged 24, an American, non-immune occupant of Tent No. 2, with his full consent, was bitten at 10 a. m., November 26, 1900, by a mosquito (*C. fasciatus*) which twelve days before had bitten a case of yellow fever of moderate severity, on the third day of the disease. This insect had also bitten a well-marked case of fellow fever (second day) ten days previously.

November 29, at 2.20 p. m., Moran was again bitten by the same mosquito. The result of both of these inoculations was negative. This insect was, therefore, incapable of conveying the infection fifteen days after having bitten a case of yellow fever of moderate severity on the third day, and thirteen days after it had bitten a well-marked case of this disease on the second day. This mosquito had been kept at room temperature. Moran's case will be again referred to when we come to speak of the infection of a building by means of contaminated mosquitoes.

Case 4.—A Spanish immigrant, aged 26, a non-immune occupant of tent No. 5, with his full consent, was bitten at 4 p. m., December 8, 1900, by four mosquitoes (*C. fasciatus*) which had been contaminated as follows: One by biting a fatal case of yellow fever, on the third day, seventeen days before; one a severe one, on the third day, eighteen days before; one a severe case, on the second day, twenty-two days before, and one a case of moderate severity, on the third day, twenty-four days previously.

The record of temperature and pulse, taken every three hours after the inoculation, shows no rise of temperature above 99 F. until 6 p. m., December 13 (sixth day), when 99.4° F. is recorded; pulse 68. The subject, who was of a very lively disposition, retained his usual spirits until noon of the 13th, although he complained of a slight frontal headache on the 11th and 12th. He took to his bed at noon of the 13th (fifth day), complaining of increased frontal headache and a sense of fatigue. At 9 p. m. his temperature was 98.2° F., pulse 62.

December 14, at 6 a. m., temperature was 98° F., pulse 72, and he still complained of frontal headache and general malaise. Profuse epistaxis occurred at 7.45 a. m.; at 9 a. m., temperature 99.6° F., pulse 80; 1.15 p. m., temperature 100° F., pulse 80; he complained of a sense of chilliness, with frontal headache increased, and slight pain in the back, arms, and legs; 3 p. m., temperature 100° F., pulse 80; 4.15 p. m., temperature 100.7° F., pulse 68; his face was flushed and eyes congested. He was removed to the yellow-fever wards. A trace of albumin was found in the urine passed at 3.30 p. m., December 15; a few hyaline casts were also present. He was seen at this time by the Habana board of experts and the diagnosis of mild yellow fever confirmed. (See Chart No. IV.)

The period of incubation in this case was four days and twenty hours, counting from the time of inoculation to the hour when the patient took to his bed; if reckoned to the onset of fever, it was five days and seventeen hours.

Case 4.—A Spanish immigrant, aged 27, a non-immune occupant of tent No. 5, with his full consent, was bitten at 10 a. m., November 26, 1900, by a mosquito (*C. fasciatus*) which had bitten a severe case of yellow fever on the second day, ten days before. Three days later, November 29, he was again bitten by the same insect. December 2, after an interval of three days, he was again bitten by the same insect, and also by a second mosquito (*C. fasciatus*) which, twelve days before, had been contaminated by biting a fatal case of yellow fever on the third day. No unfavorable effects followed any of these attempted inoculations. The first-mentioned mosquito, therefore, was incapable of conveying any infection on the seventeenth day, after biting a severe case of yellow fever on the second day; the other also failed to infect on the

CHART III.—*Yellow fever produced by the bite of Culex fasciatus.*

[Period of incubation, 3 days 9½ hours.]

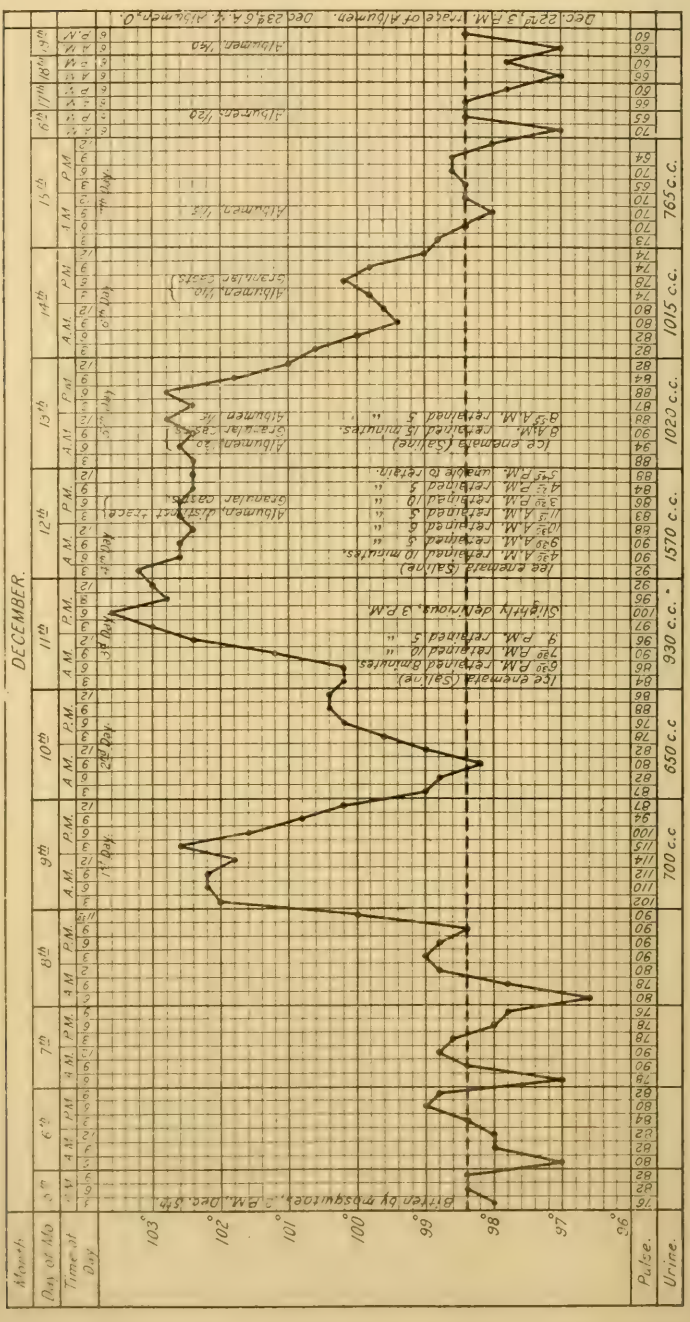
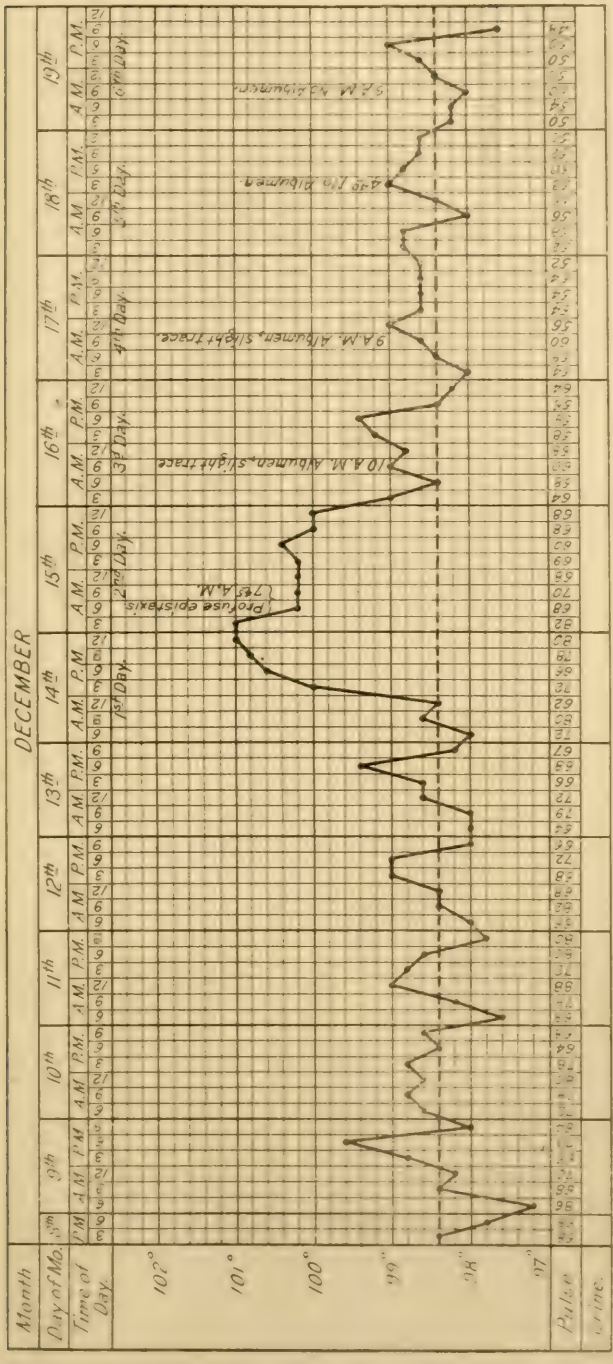

DECEMBER.
Bitten by mosquito, 2 P.M., Dec. 5th.
Dec. 22nd, 3 P.M. Trace of Albumen. Dec. 23rd, 6 A.M. Albumen, O.
Ice enemata (Saline)
Albumen, distinct trace
Albumen, ½ (granular casts)
Albumen, ½
Albumen, ½
Albumen, ½

CHART IV.—*Yellow fever produced by the bite of Culex fasciatus.*

[Period of incubation, 4 days 20 hours.]



twelfth day, after biting a fatal case of yellow fever on the third day. Both of these mosquitoes had been kept at ordinary room temperature.

December 9, after an interval of seven days, the subject was again bitten, at 10.30 a. m., by one mosquito (*C. fasciatus*) which had been infected nineteen days before by biting a fatal case of yellow fever on the second day of the disease. He remained in his usual health until 9 a. m., December 12 (third day), when he complained of frontal headache; his temperature was 98.8° F.; pulse 96. This headache continued during the entire day. At 6 p. m. temperature was 99° F., pulse 94; 9 p. m., temperature 99° F., pulse 84; 9.30 p. m., temperature 99.4° F., pulse 82. Severe headache and backache was complained of; his eyes were injected and his face suffused. The following morning he was sent to the yellow-fever wards. Urine passed at 4.20 p. m., December 15, the third day, gave a distinct trace of albumin. Many hyaline casts were present on the same date. The conjunctivæ were jaundiced on the third day.

The patient was seen by the board of experts on December 14, and the diagnosis of yellow fever made. (See Chart No. V.)

The period of incubation in this case was three days and eleven and one-half hours.

Case 5.—A Spanish immigrant, aged 26, a non-immune occupant of tent No. 5, with his full consent, was bitten at 10 a. m., November 26, 1900, by a mosquito (*C. fasciatus*) that had bitten a well-marked case of yellow fever on the third day, twelve days before. November 29 he was again bitten by the same insect. December 2 he was for the third time bitten by two mosquitoes (*C. fasciatus*), both of which had bitten a well-marked case of yellow fever on the third day, eighteen days before. As no bad results followed any of these inoculations, it follows that these mosquitoes were incapable of conveying any infection eighteen days after they had bitten a well-marked case of yellow fever on the third day. Both of these insects had been kept at room temperature.

December 11, after an interval of nine days, the subject was again, at 4.30 p. m., bitten by the same mosquitoes, four in number, that had been applied to case 3, three days prior to this time, with positive results.

The record of temperature and pulse, taken every three hours following the inoculation, showed no change till December 13 (second day), at 9 a. m., when the temperature was 99° F., and the pulse 78. From this hour till 6 p. m. the temperature varied from 99.2° to 99.6° F. The subject complained of frontal headache, slight in degree, during the entire day. At 9 p. m. his temperature was 98.4° F., pulse 62.

December 14 (third day), he complained of slight frontal headache during the entire day, and was indisposed to exertion. From 6 a. m. to 6 p. m. the temperature averaged 99.2° F., and the pulse varied from 64 to 90; at 9 p. m. it was 98.4° F., pulse 78. December 15 (fourth day), at 6 a. m., temperature was 98.2° F., pulse 78. He still had frontal headache. At 9 a. m. temperature was 99.2° F, pulse 80; at 12 noon the former was 99.2° F., pulse 74. The subject now went to bed, complaining of headache and pains throughout the body. At 2 p. m. the temperature was 100° F., pulse 80; eyes much congested; face flushed. At 6 p. m. his temperature had risen to 102° F., and the pulse to 90. He was then transferred to the yellow-fever wards. Albumin appeared in the urine at 7.30 a. m., December 17. Bleeding from the gums and roof of the mouth occurred on the sixth and seventh days of his illness.

This case was examined by board of experts on the 16th and 19th, and the diagnosis of yellow fever made.

Albumin disappeared on the sixth day, the temperature falling to normal on this date, and remaining near this point till December 23, the ninth day of sickness, when a relapse occurred, attended with bleeding from the gums on December 24 and 25, with the appearance of red blood cells and pus cells in the urine in moderate numbers. Fever subsided on December 26, and the urine became normal on December 29. (See Chart VI.)

The period of incubation in this case, if reckoned from the time of inoculation to the hour when the patient took to his bed, was three days and nineteen and one-half hours.

The four patients whose histories we have given above were also examined by a number of physicians of Habana, among whom we may mention Dr. Bango, of La Covadonga; Dr. Sanchez, of La Benéfica, and Dr. Moas, of La Purissima Concepcion, by all of whom the diagnosis of yellow fever was confirmed.

Let us now rapidly review the circumstances attending these cases of experimental yellow fever, in order to emphasize certain points of interest and importance in connection with their occurrence. (We omit any reference to the clinical histories.)

It should be borne in mind that at the time when these inoculations were begun there were only 12 non-immune residents at Camp Lazear, and that 5 of these were selected for experiment, viz, 2 in tent No. 2 and 3 in tent No. 5. Of these we suc-

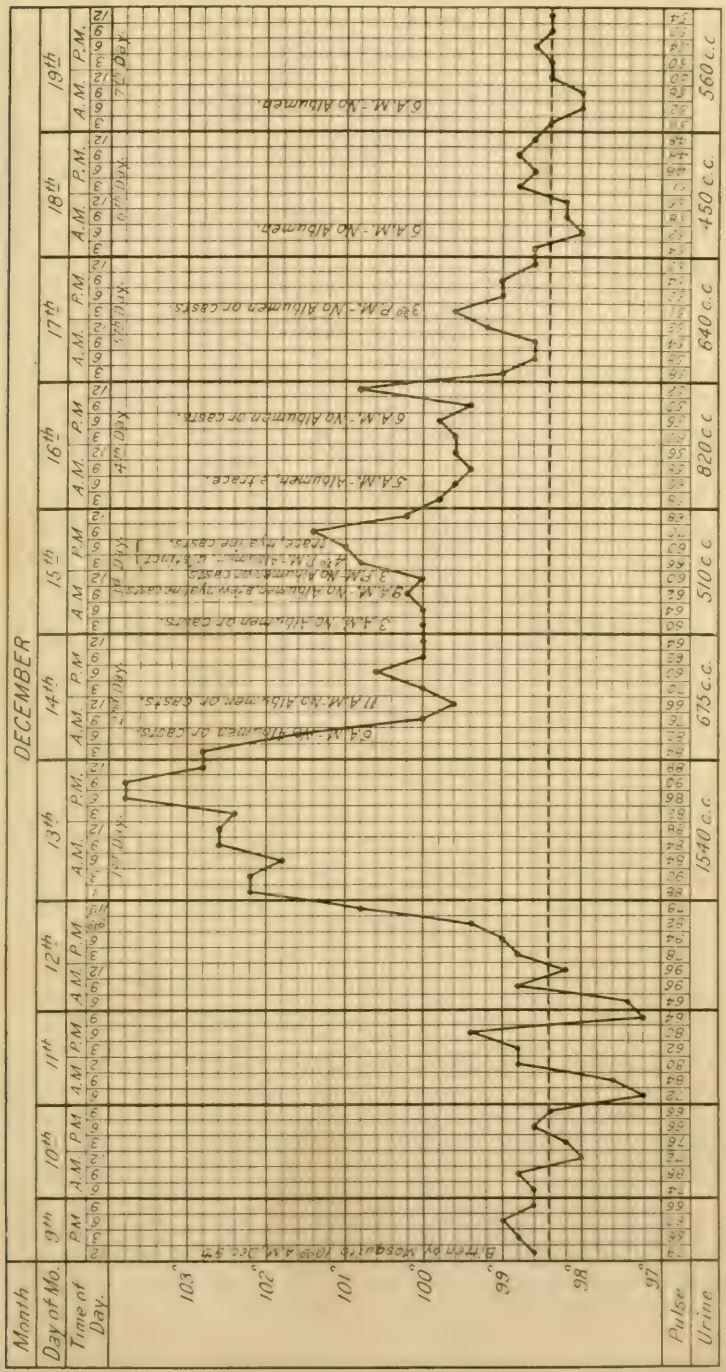
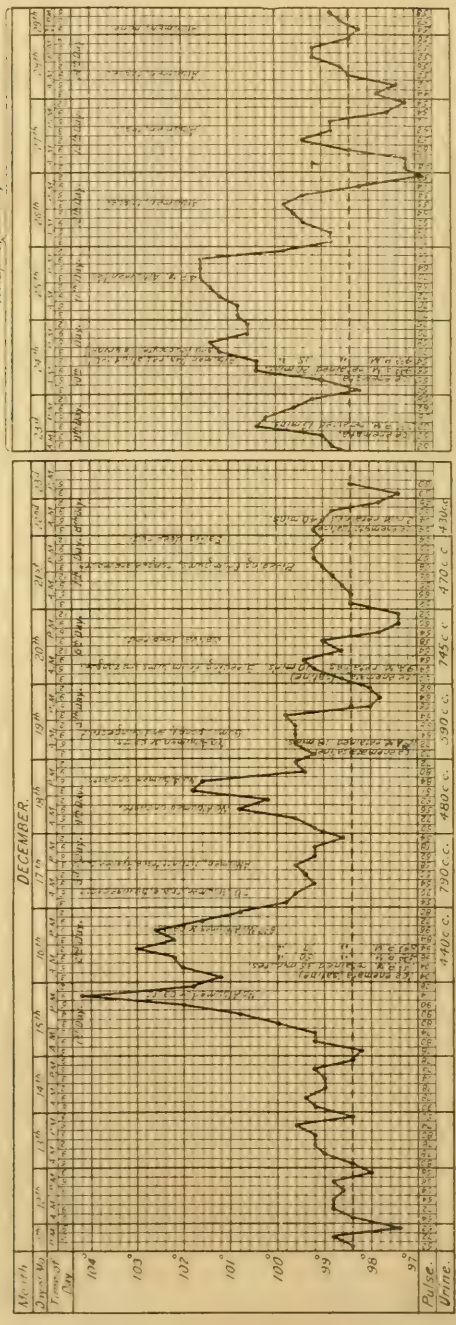

DECEMBER
Month
Day of Mo.
Time of Day.
Pulse
Urine
Bitten by Mosquito 10:30 A.M. Dec 9th
6 A.M. - No Albumen.
320 P.M. - No Albumen or casts.
6 A.M. - No Albumen or casts.
5 A.M. - Albumen, a trace.
6 A.M. - No Albumen or casts.
6 A.M. - No albumen or casts.
11 A.M. No albumen or casts.
6 A.M. - No albumen or casts.
3 A.M. No albumen or casts.
9 A.M. - No albumen or casts. Urine acid.
3 P.M. No albumen or casts.
4:30 P.M. - Urine acid.
Trace of urea casts.
560 c.c.
450 c.c.
640 c.c.
820 c.c.
510 c.c.
675 c.c.
1540 c.c.

CHART V.—*Yellow fever produced by the bite of Culex fasciatus.*

[Period of incubation, 3 days 11 hours.]

CHART VI.—*Yellow fever produced by the bite of Culex fasciatus.*

[Period of incubation, 3 days 19½ hours.]



ceeded in infecting 4, viz, 1 in tent No. 2 and 3 in tent No. 5, each of whom developed an attack of yellow fever within the period of incubation of this disease. The one negative result, therefore, was in case 2—Moran—inoculated with a mosquito on the fifteenth day after the insect had bitten a case of yellow fever on the third day. Since this mosquito failed to infect case 4, three days after it had bitten Moran, it follows that the result could not have been otherwise than negative in the latter case. We now know, as the result of our observations, that in the case of an insect kept at room temperature during the cool weather of November, fifteen or even eighteen days would, in all probability, be too short a time to render it capable of producing the disease.

As bearing upon the source of infection, we invite attention to the period of time during which the subjects had been kept under rigid quarantine prior to successful inoculation, which was as follows: Case 1, fifteen days; case 3, nine days; case 4, nineteen days; case 5, twenty-one days. We further desire to emphasize the fact that this epidemic of yellow fever, which affected 33.33 per cent of the non-immune residents of Camp Lazear, did not concern the 7 non-immunes occupying tents Nos. 1, 4, 6, and 7, but was strictly limited to those individuals who had been bitten by contaminated mosquitoes.

Nothing could point more forcibly to the source of this infection than the order of the occurrence of events at this camp. The precision with which the infection of the individual followed the bite of the mosquito left nothing to be desired in order to fulfill the requirements of a scientific experiment.

The epidemic having ceased on December 15, 1900, no other case of yellow fever occurred in this camp until we again began to expose individuals to inoculation. Thus fifteen days later we made the following observation:

Case 6.—A Spanish immigrant, aged 27, a non-immune occupant of tent No. 6, with his full consent, was bitten at 11 a. m., December 30, 1900, by four mosquitoes (*C. fasciatus*) that had been contaminated seventeen days previously by biting a mild case of yellow fever on the first day of the disease (case 4). These insects had been kept at temperature of 82° F.

The subject remained in his normal condition until the evening of January 2, 1901, the third day, when he complained of frontal headache. At 6 p. m. his temperature was 99° F.; pulse, 64. He slept well, but still complained of headache on the following morning, January 3. He partook sparingly of breakfast and afterward lay on his bed, being disinclined to exert himself. At 9 a. m. the temperature was 99° F., pulse 96; 10.30 a. m., temperature 100° F., pulse 80. A sense of chilliness and sharp frontal headache were complained of. At 3 p. m. his temperature was 100.8° F., pulse 80; his eyes were congested and face flushed. He was removed to the yellow fever wards. A specimen of urine passed at midnight, January 4, contained a distinct trace of albumin. Slight bleeding from the gums occurred on the fifth and sixth days. The patient was seen by the board of experts on the second and seventh days of his attack, and the diagnosis of yellow fever confirmed. (See Chart VII.)

The period of incubation in this case was three days, twenty-two and one-half hours. The subject had remained in strict quarantine for twenty-two days preceeding his inoculation.

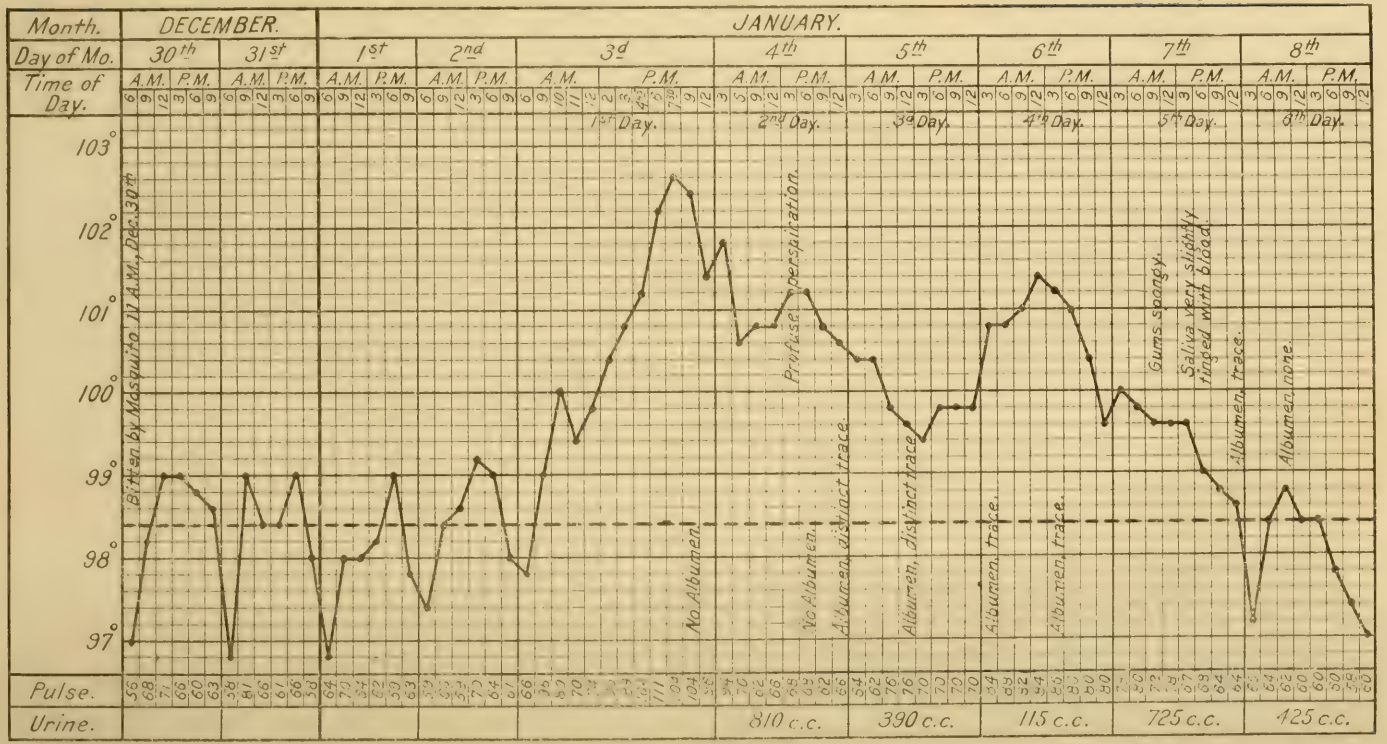
In considering the character of the attacks and the course of the disease in these five cases of experimental yellow fever, it must be borne in mind that these infected individuals were all young men, in good general physical condition and placed amid excellent hygienic surroundings. Further, it must not be forgotten that, upon the earliest manifestation of an approaching infection, they were each and all put to bed at once, and were even carried to the yellow fever wards while occupying the same bed. In other words, these men were kept at absolute rest from the first inception of the disease. Just what bearing this may have had on the subsequent course of the fever, we can not say, but since so much stress is laid on absolute rest of the patient by those having most experience in the treatment of yellow fever, the influence of this enforced rest, in our cases, upon the subsequent course of the attack, was doubtless of much importance. We reserve a consideration of the clinical side of these cases for a future report.

In our opinion the experiments above described conclusively demonstrate that an attack of yellow fever may be readily induced in the healthy subject by the bite of mosquitoes (*C. fasciatus*) which have been previously contaminated by being fed with the blood of those sick with yellow fever, provided the insects are kept for a sufficient length of time after contamination before being applied to the person to be infected.

Our observations do not confirm Finlay's statement that the bite of the mosquito may confer an abortive attack of yellow fever, when applied to the healthy subject two to six days after it has bitten a yellow fever patient. We have always failed to

CHART VII.—*Yellow fever, produced by the bite of Culex fasciatus.*

[Period of incubation, 3 days 22 hours.]



induce an attack, even of the mildest description, when we have used mosquitoes within less than twelve days from the time of contamination, although the insects were constantly kept at summer temperature. We could cite instances where we have applied mosquitoes at intervals of two, three, four, five, six, nine, and eleven days following the contamination of the insect with the blood of well-marked cases of yellow fever, early in the disease, without any effect whatever being produced by the bite. Thus in one case no result followed the bite of 14 mosquitoes which four days previously had been contaminated by biting a case of yellow fever on the first day. Again, seven days later, or eleven days after contamination, the surviving seven of these insects failed to infect an individual. On the seventeenth day after contamination, however, the bite of four of these mosquitoes—all that remained of the original fourteen—was promptly followed by an attack of yellow fever in the same individual. These insects had been kept, during the whole of this time, at an average temperature of 82° F.

Our observations would seem to indicate that after the parasite has been taken into the mosquito's stomach, a certain number of days must elapse before the insect is capable of reconveying it to man. This period doubtless represents the time required for the parasite to pass from the insect's stomach to its salivary glands, and would appear to be about twelve days in summer weather, and most probably about eighteen or more days during the cooler winter months. It follows also that our observations do not confirm Finlay's opinion that the bite of the contaminated mosquito without producing the disease may confer immunity against a subsequent attack of yellow fever. In our experience, an individual may be bitten on three or more occasions by contaminated mosquitoes without manifesting any symptoms of disturbance to health, and yet promptly sicken with yellow fever within a few days after being bitten by an insect capable of conveying the infection.

II. Having shown that yellow fever can be conveyed by the bite of an infected mosquito, it remains to inquire whether this disease can be acquired in any other manner. It has seemed to us that yellow fever, like the several types of malarial fever, might be induced by the injection of blood taken from the general circulation of a patient suffering with this disease. Accordingly we have subjected four individuals to this method of infection, with one negative and three positive results. Reserving the detailed description of these cases to a subsequent occasion, we may state that in one of the positive cases, an attack of pronounced yellow fever followed the subcutaneous injection of 2 cubic centimeters of blood taken from a vein at the bend of the elbow, on the first day of the disease, the period of incubation being three days and twenty-two hours; in the second case, 1.5 cubic centimeters of blood, taken on the first day of the disease, and injected in the same manner, brought about an attack within two days and twelve hours; while in our third case, the injection of 0.5 cubic centimeters of blood taken on the second day of the disease, produced an attack at the end of forty-one hours.

In the case mentioned as negative to the blood injection, the subsequent inoculation of this individual with mosquitoes already proved to be capable of conveying the disease, also resulted negatively. We think, therefore, that this particular individual, a Spanish immigrant, may be considered as one who probably possesses a natural immunity to yellow fever.

It is important to note that in the three cases in which the injection of the blood brought about an attack of yellow fever, careful cultures from the same blood, taken immediately after injection, failed to show the presence of Sanarelli's bacillus.[1]

Our observations, therefore, show that the parasite of yellow fever is present in the general and capillary circulation, at least during the early stages of this disease, and that the latter may be produced, like malarial fever, either by means of the bite of the mosquito, or by the injection of blood taken from the general circulation.

III. Can yellow fever be propagated in any other way?

We believe that the general consensus of opinion both of the medical profession and of the laity is strongly in favor of the conveyance of yellow fever by fomites.

[1] A fourth case of yellow fever, severe in type, has been produced by the subcutaneous injection of 1 cubic centimeter of blood taken from the general circulation on the second day of the disease, the period of incubation being three days and one hour. The patient, from whom the blood was obtained, was an experimental case, which was in turn produced by the injection of blood—0.5 cubic centimeters—derived from a non-experimental case of fatal yellow fever. As "controls," cases 1, 4, 6, and 7 of this report were also injected subcutaneously with 1 cubic centimeter of the same blood without manifesting any symptoms whatever. The blood which produced this fourth case of yellow fever, when transferred at the same time to bouillon tubes in considerable quantities, gave no growth whatever.

The origin of epidemics, devastating in their course, has been frequently attributed to the unpacking of trunks and boxes that contained supposedly infected clothing; and hence the efforts of health authorities, both State and national, are being constantly directed to the thorough disinfection of all clothing and bedding shipped from ports where yellow fever prevails. To such extremes have efforts at disinfection been carried, in order to prevent the importation of this disease into the United States, that during the epidemic season all articles of personal apparel and bedding have been subjected to disinfection, sometimes both at the port of departure and at the port of arrival; and this has been done whether the articles have previously been contaminated by contact with yellow fever patients or not. The mere fact that the individual has resided, even for a day, in a city where yellow fever is present, has been sufficient cause to subject his baggage to rigid disinfection by the sanitary authorities.

To determine, therefore, whether clothing and bedding, which have been contaminated by contact with yellow fever patients and their discharges, can convey this disease is a matter of the utmost importance. Although the literature contains many references to the failure of such contaminated articles to cause the disease, we have considered it advisable to test, by actual experiment on non-immune human beings, the theory of the conveyance of yellow fever by fomites, since we know of no other way in which this question can ever be finally determined.

For this purpose, there was erected at Camp Lazear a small frame house consisting of one room 14 by 20 feet, and known as "Building No. 1," or the "infected clothing and bedding building." The cubic capacity of this house was 2,800 feet. It was tightly ceiled within with tongue and grooved boards, and was well battened on the outside. It faced to the south and was provided with two small windows, each 26 by 34 inches in size. These windows were both placed on the south side of the building, the purpose being to prevent, as much as possible, any thorough circulation of the air within the house. They were closed by permanent wire screens of 0.5 millimeter mesh. In addition, sliding glass sashes were provided within and heavy wooden shutters without; the latter intended to prevent the entrance of sunlight into the building, as it was not deemed desirable that the disinfecting qualities of sunlight, direct or diffused, should at any time be exerted on the articles of clothing contained within this room. Entrance was effected through a small vestibule, 3 by 5 feet, also placed on the southern side of the house. This vestibule was protected without by a solid door and was divided in its middle by a wire screen door, swung on spring hinges. The inner entrance was also closed by a second wire-screen door. In this way the passage of mosquitoes into this room was effectually excluded. During the day and until after sunset the house was kept securely closed, while by means of a suitable heating apparatus the temperature was raised to 92 to 95° F. Precaution was taken at the same time to maintain a sufficient humidity of the atmosphere. The average temperature of this house was thus kept at 76.2° F. for a period of sixty-three days.

November 30, 1900, the building now being ready for occupancy, three large boxes filled with sheets, pillow slips, blankets, etc., contaminated by contact with cases of yellow fever and their discharges, were received and placed therein. The majority of the articles had been taken from the beds of patients sick with yellow fever at Las Animas Hospital, Habana, or at Columbia Barracks. Many of them had been purposely soiled with a liberal quantity of black vomit, urine, and fecal matter. A dirty "comfortable" and much-soiled pair of blankets, removed from the bed of a patient sick with yellow fever in the town of Quemados, were contained in one of these boxes. The same day, at 6 p. m., Dr. R. P. Cooke, acting assistant surgeon, United States Army, and two privates of the hospital corps, all non-immune young Americans, entered this building and deliberately unpacked these boxes, which had been tightly closed and locked for a period of two weeks. They were careful at the same time to give each article a thorough handling and shaking, in order to disseminate through the air of the room the specific agent of yellow fever, if contained in these fomites. These soiled sheets, pillow-cases, and blankets were used in preparing the beds in which the members of the hospital corps slept. Various soiled articles were hung around the room and placed about the bed occupied by Dr. Cooke.

From this date until December 19, 1900, a period of twenty days, this room was occupied each night by these three non-immunes. Each morning the various soiled articles were carefully packed in the aforesaid boxes, and at night again unpacked and distributed about the room. During the day the residents of this house were permitted to occupy a tent pitched in the immediate vicinity, but were kept in strict quarantine.

December 12, a fourth box of clothing and bedding was received from Las Animas Hospital. These articles had been used on the beds of yellow-fever patients, but in addition had been purposely soiled with the bloody stools of a fatal case of this dis-

case. As this box had been packed for a number of days, when opened and unpacked by Dr. Cooke and his assistants, on December 12, the odor was so offensive as to compel them to retreat from the house. They pluckily returned within a short time, however, and spent the night as usual.

December 19 these three non-immunes were placed in quarantine for five days and then given the liberty of the camp. All had remained in perfect health, notwithstanding their stay of twenty nights amid such unwholesome surroundings.

During the week, December 20–27, the following articles were also placed in this house, viz: Pajamas suits, 1; undershirts, 2; nightshirts, 4; pillow-slips, 4; sheets, 6; blankets, 5; pillows, 2; mattresses, 1. These articles had been removed from the persons and beds of four patients sick with yellow fever, and were very much soiled, as any change of clothing or bed-linen during their attacks had been purposely avoided, the object being to obtain articles as thoroughly contaminated as possible.

From December 21, 1900, till January 10, 1901, this building was again occupied by two non-immune young Americans, under the same conditions as the preceding occupants, except that these men slept every night in the very garments worn by yellow-fever patients throughout their entire attacks, besides making use exclusively of their much-soiled pillow-slips, sheets, and blankets. At the end of twenty-one nights of such intimate contact with these fomites, they also went into quarantine, from which they were released five days later in perfect health.

From January 11 till January 31, a period of twenty days, "Building No. 1" continued to be occupied by two other non-immune Americans, who, like those who preceded them, have slept every night in the beds formerly occupied by yellow-fever patients, and in the nightshirts used by these patients throughout the attack, without change. In addition, during the last fourteen nights of their occupancy of this house they have slept each night with their pillows covered with towels that had been thoroughly soiled with the blood drawn from both the general and capillary circulation, on the first day of the disease, in the case of a well-marked attack of yellow fever. Notwithstanding this trying ordeal, these men have continued to remain in perfect health.

The attempt which we have therefore made to infect "Building No. 1," and its seven non-immune occupants, during a period of sixty-three days, has proved an absolute failure. We think we can not do better here than to quote from the classic work of La Roche.[1] This author says: "In relation to the yellow fever, we find so many instances establishing the fact of the non-transmissibility of the disease through the agency of articles of the kind mentioned, and of merchandise generally, that we can not but discredit the accounts of a contrary character assigned in medical writings, and still more to those presented on the strength of popular report solely. For if, in a large number of well-authenticated cases, such articles have been handled and used with perfect impunity, and that, too, often under circumstances best calculated to insure the effect in question, we have every reason to conclude that a contrary result will not be obtained in other instances of a similar kind; and that, consequently, the effect said to have been produced by exposure to those articles must, unless established beyond the possibility of doubt, be referred to some other agency."

The question here naturally arises, How does a house become infected with yellow fever? This we have attempted to solve by the erection at Camp Lazear of a second house, known as "Building No. 2," or the "infected-mosquito building." This was in all respects similar to "Building No. 1," except that the door and windows were placed on opposite sides of the building so as to give through-and-through ventilation. It was divided, also, by a wire-screen partition extending from floor to ceiling, into two rooms 12 by 14 feet and 8 by 14 feet, respectively. Whereas all articles admitted to Building No. 1 had been soiled by contact with yellow-fever patients, all articles admitted to Building No. 2 were first carefully disinfected by steam before being placed therein.

On December 21, 1900, at 11.45 a. m., there were set free in the larger room of this building 15 mosquitoes (*C. fasciatus*), which had previously been contaminated by biting yellow-fever patients, as follows: One, a severe case, on the second day, November 27, 1900, twenty-four days; 3, a well-marked case, on the first day, December 9, 1900, twelve days; 4, a mild case, on the first day, December 13, 1900, eight days; 7, a well-marked case on the first day, December 16, 1900, five days; total, 15.

Only one of these insects was considered capable of conveying the infection, viz, the mosquito that had bitten a severe case twenty-four days before; while three others—the twelve-day insects—had possibly reached the dangerous stage, as they have been kept at an average temperature of 82 F.

[1] R. La Roche, Yellow Fever, vol. ii, p. 516, Philadelphia.

At 12 noon of the same day, John J. Moran—already referred to as Case 2 in this report—a non-immune American, entered the room where the mosquitoes had been freed, and remained thirty minutes. During this time he was bitten about the face and hands by several insects. At 4.30 p. m., the same day, he again entered and remained twenty minutes, and was again bitten. The following day, at 4.30 p. m., he, for the third time, entered the room, and was again bitten.

Case 7.—On December 25, 1900, at 6 a. m., the fourth day, Moran complained of slight dizziness and frontal headache. At 11 a. m. he went to bed, complaining of increased headache and malaise, with a temperature of 99.6° F., pulse 88; at noon the temperature was 100.4° F., the pulse 98; at 1 p. m., 101.2° F., the pulse 96, and his eyes were much injected and face suffused. He was removed to the yellow-fever wards. He was seen on several occasions by the board of experts and the diagnosis of yellow fever confirmed. (See Chart VIII.)

The period of incubation in this case, dating from the first visit to Building No. 2, was three days and twenty-three hours. If reckoned from his last visit, it was two days and eighteen hours. There was no other possible source for his infection, as he had been strictly quarantined at Camp Lazear for a period of thirty-two days prior to his exposure in the mosquito building.

During each of Moran's visits two non-immunes remained in this same building, only protected from the mosquitoes by the wire-screen partition. From December 21, 1900, till January 8, 1901, inclusive—eighteen nights—these non-immunes have slept in this house, only protected by the wire-screen partition. These men have remained in perfect health to the present time.

December 28, after an interval of seven days, this house was again entered by a non-immune American, who remained twenty-five minutes. The subject was bitten by only one insect. The following day he again entered and remained fifteen minutes, and was again bitten by one mosquito. The result of these two visits was entirely negative. As the mortality among the insects in this room, from some unknown cause, had been surprisingly large, it is possible that the subject was bitten by insects not more than thirteen days old, in which case they would probably not infect, since they had been kept for only five days at a temperature of 82° F., and for eight days at the mean temperature of the room, 78° F.

Be this as it may, nothing can be more striking or instructive as bearing upon the cause of house infection in yellow fever than when we contrast the results obtained in our attempts to infect Buildings No. 1 and No. 2; for whereas in the former all of seven non-immunes escaped the infection, although exposed to the most intimate contact with the fomites for an average of twenty-one nights each; in the latter, an exposure, reckoned by as many minutes, was quite sufficient to give an attack of yellow fever to one out of two persons who entered the building—50 per cent.

Thus at Camp Lazear, of seven non-immunes whom we attempted to infect by means of the bites of contaminated mosquitoes, we have succeeded in conveying the disease to six, or 85.71 per cent. On the other hand, of seven non-immunes whom we tried to infect by means of fomites, under particularly favorable circumstances, we did not succeed in a single instance. Out of a total of eighteen non-immunes whom we have inoculated with contaminated mosquitoes since we began this line of investigation, eight, or 44.4 per cent, have contracted yellow fever. If we exclude those individuals bitten by mosquitoes that had been kept less than twelve days after contamination, and which were, therefore, probably incapable of conveying the disease, we have to record eight positive and two negative results—80 per cent.

CONCLUSIONS.

1. The mosquito—*C. fasciatus*—serves as the intermediate host for the parasite of yellow fever.

2. Yellow fever is transmitted to the non-immune individual by means of the bite of the mosquito that has previously fed on the blood of those sick with this disease.

3. An interval of about twelve days or more after contamination appears to be necessary before the mosquito is capable of conveying the infection.

4. The bite of the mosquito at an earlier period after contamination does not appear to confer any immunity against a subsequent attack.

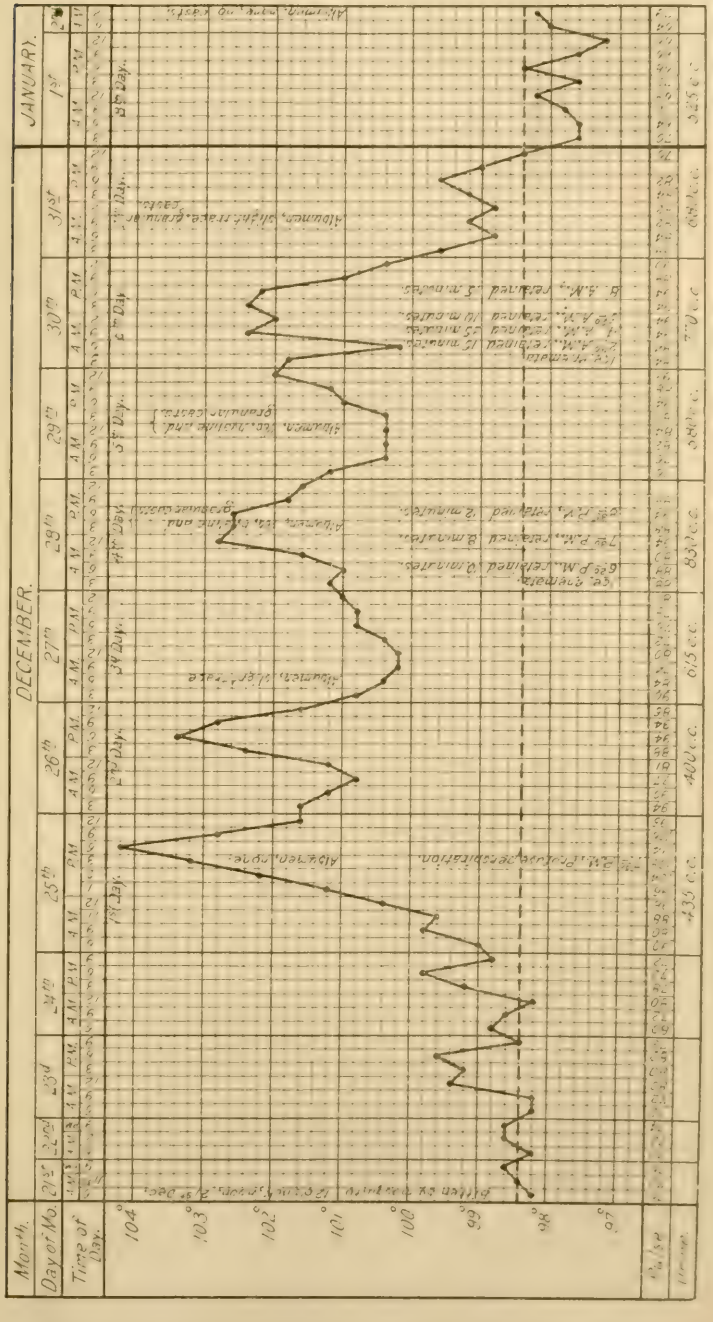
5. Yellow fever can also be experimentally produced by the subcutaneous injection of blood taken from the general circulation during the first and second days of this disease.

6. An attack of yellow fever, produced by the bite of the mosquito, confers immunity against the subsequent injection of the blood of an individual suffering from the non-experimental form of this disease.

7. The period of incubation in thirteen cases of experimental yellow fever has varied from forty-one hours to five days and seventeen hours.

CHART VI.—*Yellow fever, produced by the bite of Culex fasciatus.*

[Period of incubation, 3 days 23 hours.]


DECEMBER.
JANUARY.
Month.
Day of Mo.
Time of Day.
Pulse.
Temperature.
104°
103°
102°
101°
100°
99°
98°
97°
Mosquito fed on patient, 2d Dec.
Mosquito applied to patient.
Mosquito died.
Mosquito died.
Mosquito died

8. Yellow fever is not conveyed by fomites, and hence disinfection of articles of clothing, bedding, or merchandise, supposedly contaminated by contact with those sick with this disease, is unnecessary.

9. A house may be said to be infected with yellow fever only when there are present within its walls contaminated mosquitoes capable of conveying the parasite of this disease.

10. The spread of yellow fever can be most effectually controlled by measures directed to the destruction of mosquitoes and the protection of the sick against the bites of these insects.

11. While the mode of propagation of yellow fever has now been definitely determined, the specific cause of this disease remains to be discovered.

BOARD FOR THE INVESTIGATION OF TROPICAL DISEASES IN THE PHILIPPINES.

The constitution of this board and the instructions for its guidance were published in my last annual report, page 21. During the year First Lieut. Richard P. Strong, assistant surgeon, United States Army, became president of the board on account of the relief of Lieut. Jere B. Clayton, assistant surgeon, United States Army, and his return to the United States for home service. First Lieut. W. C. Calvert, assistant surgeon, United States Army, was assigned to fill the vacancy on the board.

Much excellent work has been done by this board in the study of animal parasites, dysentery, fevers, bubonic plague, and other tropical diseases, while some valuable reports have been received from medical officers not members of the board. Under date of December 14, 1900, the chief surgeon, Division of the Philippines, reported that Lieutenant Strong, president of the board, had reached certain conclusions regarding the pathology of animal parasitic diseases and diseases peculiar to the Tropics which would be of value as diagnostic aids in caring for patients in the hospitals in the Philippines, and suggested that authority be given to publish, in the shape of circulars to the medical officers of the command, such excerpts from the reports on these subjects as might be deemed of general value. This authority was granted, and shortly afterwards Circulars on Tropical Diseases Nos. I, II, and III were published. Circular No. I, by Lieut. R. P. Strong, published in February, 1901, discusses the subject of animal parasites. Circular No. II, also by Lieutenant Strong, published in April, 1901, gives full information concerning dysentery and its causes. The substance of this circular was published in my last annual report, pages 251–273. Circular No. III, by Lieut. W. J. Calvert, assistant surgeon, United States Army, published in May, 1901, consists of an epitome of our knowledge on the subject of bubonic plague. The value of these circulars has been so highly appreciated by medical men that calls for copies of them are constantly being received.

Valuable articles have been submitted by Joseph J. Curry, acting assistant surgeon, United States Army, one of the members of the board. These, however, have already been published in the Boston Medical and Surgical Journal: "Pathological laboratories in the Philippines," in the issue of February 21, 1901, page 175; "Dysenteric diseases in the Philippines," in the same issue, page 177; "Bubonic plague—Report on the plague in Manila, P. I., from January 1, 1900, to June 30, 1900," in the issue of March 21, 1901, and, lastly, "The fevers of the Philippines—A preliminary report on the nature of the fevers prevalent in the Philippine Islands, including typhoid fever,

Malta fever, the malarial fevers, and undetermined tropical fevers," in the issue of May 9, 1901, page 446.

An interesting report on beri-beri, as it prevailed in the prisons at Lingayen, Pangasinan, P. I., was rendered June 4, 1901, by Acting Asst. Surg. Frank L. R. Tetamore, United States Army, which is submitted below, page 236.

BOARD FOR THE INVESTIGATION OF TROPICAL DISEASES IN THE PHILIPPINES.
CIRCULAR NO. 1.

ANIMAL PARASITES.

The study of the intestinal parasites is based upon 1,793 stool examinations and upon the scrutiny of the intestinal contents from 386 necropsies.

The brief descriptions are given of the parasites as they occur in these islands, and sometimes not with the idea of adding anything new, either to their life history, anatomical structure, or pathological significance. They are recorded in this form because it is hoped they may give some idea to physicians who have lately arrived in the Philippines of the more common intestinal parasites to be encountered here. A word on treatment has been suggested, as our surgeons have sometimes found literature very scarce in the provinces.

PROTOZOA.

Two varieties of the class Sarcodina have been encountered.

1. Amœba dysenteriæ.—This amœba varies from 20 to 48 μ in diameter. It possesses an endosarc and ectosarc which can readily be distinguished when the parasite is in motion. The endosarc is granular and usually incloses several vacuoles of variable size and, very frequently, red blood corpuscles. The larger forms may contain from 20 to 25 red blood cells. Pigment granules and bacteria have also been observed lying in the endosarc. On one occasion a red corpuscle which contained a tertian malarial parasite was seen inclosed in an amœba.

The parasite moves about by means of pseudopodia; blunt processes consisting of the ectosarc are first protruded, and into these protrusions the protoplasm of the endosarc appears to flow. The parasite possesses a nucleus which may often be observed in the living forms, but which can be more clearly seen in preparations stained with thionin. The nucleus is usually placed eccentrically and frequently contains a nucleolus. Sometimes in stools that have contained motile amœbæ, after a time round bodies appear which are suggestive of, and may perhaps represent, the forms described as encysted amœbæ. They have a double outline and generally inclose several round vesicles. It is still doubtful, however, whether these forms are really encysted amœbæ. We have occasionally observed what were apparently degenerating amœbæ. They appeared swollen, with an almost homogeneous central portion containing often a nucleus eccentrically placed and a few fine granules; outside this central portion and extending completely around it was a clear rim, containing sometimes several round bodies resembling fat droplets. Possibly these forms are allied to those described by Kruse and Pasqualle and called dropsical and colloid degenerations of amœbæ. Rarely were they observed to have any movement.

The above amœba is apparently identical with the *Amœba dysenteriæ* of Councilman and Lafleur. It has been encountered in the stools of nearly 500 cases of dysentery, and only on two occasions was it met with in the stools of individuals where no symptoms of amœbic dysentery existed at the time. One of these cases, however, had recently had dysentery. When they are present in very large numbers, the stools contain, generally, both blood and mucus, epithelial cells, and leucocytes. Portions of the stool may be at times well formed. In other instances, when they are not so abundant, the stools may be dark and fluid and contain very few red cells, but a variable number of epithelial cells and leucocytes. These amœbæ have also been found at necropsy in the lesions of the large intestine in 94 cases of dysentery. The lesions found in these cases agree with those generally accepted of amœbic dysentery. They consisted, briefly, of hemorrhagic catarrhs, always with the development of well-marked ulcerations of the large bowel. The ulcerations were circumscribed with even or ragged edges and often undermined, their bases clean, or sloughing and gangrenous. Microscopically, the parasites were found in the mucosa, submucosa, and sometimes along the intermuscular septa.

These amœbæ have also been found present in 18 liver abscesses. The abscesses answer to the description generally given of the tropical or amœbic variety. On

two occasions, where they had perforated, the amœbæ were found in abscess cavities of the right lung. In 8 of the liver-abscess cases the amœbæ were associated with bacteria. In 2 early liver abscesses the amœbæ were present and bacteria absent.

These amœbæ are pathogenic for cats, and when they are injected into the rectum of these animals, either when in the fæces and in combination with bacteria, or when in the contents of liver abscesses in which no bacteria are present, they are generally capable of giving rise to dysentery and dysenteric ulcerations of the large intestine, though the results are not invariable. The ulcerations are often very striking in their resemblance to those found in the large bowel in human amœbic dysenteric cases. We have been able to produce early ulcerations in three or four days after inoculation; after one week the ulcerations may be well marked.

Our attempts to cultivate these amœbæ in sterilized straw infusions have been unsuccessful. In unsterilized straw infusions straw amœbæ usually developed, which made any definite observations in regard to *Amœba dysenteriæ* uncertain.

We believe this amœba (*Amœba dysenteriæ*) to be the etiological factor in producing the lesions of amœbic dysentery and of amœbic liver abscesses, doubtless often aided by bacteria in bringing about the pictures seen in these diseases.

Too much stress can not be placed on the presence of *Amœba dysenteriæ* in the stools. In the Tropics, where the disease amœbic dysentery prevails to a very great extent, robust, strong men may be victims for a month or two without being aware that they are suffering from a serious malady. The clinical symptoms of the disease are often not in accord with the lesions of the large intestine. The intermittent periods of the dysentery, with often a few days' constipation, sometimes mislead the doctor and frequently the soldier; the latter, thinking himself cured, is anxious to return to duty. Our notes show a large number of cases that have been admitted to the hospitals, not once or twice, but some four and five times, and on each occasion with a diagnosis of diarrhea. These cases remain in the hospital from four or five days to a week or two; they then return to duty, when an exacerbation of the disease brings them to the hospital again; they gradually become weaker and weaker, until one finds them upon the necropsy table with advanced lesions of amœbic dysentery. Such histories are not very uncommon. The diagnosis can often not certainly be made without a microscopical examination of the stools, but once made, the local treatment with high quinine enemata should be begun and continued (often for several months) until the patient is cured. The treatment of the disease for a few days is useless. The early, careful, patient, and continued treatment gives at times good results, and often reverses the almost hopeless prognosis of the neglected cases. The surgical treatment of the disease is also to be considered in the cases that do not yield to treatment with enemata.

The *A. dysenteriæ* is the intestinal parasite most often encountered in Manila. One hundred and fourteen of 386 deaths among our troops were due to amœbic dysentery, and this malady disables many more men here than any other disease.

II. Amœba coli.—This amœba generally varies from 12 to 25μ in diameter. It likewise, as *A. dysenteriæ*, contains an endosarc and ectosarc and is endowed with similar movements. The protoplasm is not so refractive. The granules are variable in size. They may be coarser, but are more often smaller and very difficult to distinguish. The vacuoles are neither so large or so frequently present. The nucleus is small and with difficulty seen in live specimens. These amœbæ have never been observed to contain red-blood corpuscles. They apparently have no pathogenic action on cats. Repeated injection of the stools containing these amœbæ together with the intestinal bacteria have always failed to produce dysentery or dysenteric lesions in cats. They have been encountered 8 times out of 200 examinations of the stools of different individuals where we had purposely looked for them. The patients neither had diarrhea nor dysentery, and no history of these troubles. The amœbæ were found in the liquid stools after the administration of rochelle salt.

Two other cases infected with this same variety of amœba were under our observation for three months. During this time they never had any symptoms of diarrhea or dysentery. Small, motile amœbæ, never measuring more than 25μ in diameter, could always be found in their stools after a dose of salts had rendered the movements soft and watery.

Anyone who recognizes the difference between the tertian and quartan malarial parasite, should be willing to admit that *amœba coli* and *amœba dysenteriæ* are distinct varieties; indeed we have as much, if not more, evidence for recognizing the difference between these two than in the case of the tertian and quartan malarial parasite.

The amœbæ of this second variety (*A. coli*) are apparently similar to those that Schuberg and Grassi encountered and are probably the same variety that Cunning-

ham found in cholera stools. Finally, it is not unlikely that they are the same that numerous other observers have found occasionally in epidemics of acute dysentery and where it is mentioned that amœbæ were found in only one or two of the cases studied. These amœbæ have seemed to us apparently harmless.

Great variation in the size of amœbæ found in the stools is given in the literature on this subject. Thus the amœbæ found in dysenteric stools have been estimated in size from 10 to 50μ in diameter. We admit that amœbæ measuring from about 12 to 18μ in diameter might be found in dysenteric stools, but we can not agree that they are *A. dysenteriæ*. We have rarely observed *A. dysenteriæ* with a diameter of less than 25μ, and when we recall that this is less than four times the diameter of a red-blood corpuscle, the statement does not seem unreasonable. On the other hand, the diameter of amœbæ in non-dysenteric stools has been given from 12 to 36μ. It is not necessary for a stool containing *A. dysenteriæ* to be at the time a typical dysenteric stool. It is well known that the character of the stools in amœbic dysentery is often variable. We have never observed that the harmless amœbæ we found in the stools of our cases measured over 25μ in diameter; they generally more often varied from 14 to 22μ. In speaking of the diameter we have inferred, of course, the stage when the parasite is nearly circular in outline.

INFUSORIA.

Balantidium coli (Stein).—But one variety of the order of Heterotricha has been observed, viz, the *Balantidium coli* (Stein), *Paramœcium coli* (Malmsten.)

This infusoria measures from 70 to 100μ long by 60 to 70μ broad. The periphery is covered with fine, actively motile cilia. At the anterior end is a funnel-shaped entrance, which is surrounded by cilia, and which, when the parasite is moving, gives the appearance of a revolving paddle wheel. An endosare and ectosare may be distinguished, and the parasite possesses the power to change its shape and may appear quite round. The endosare contains a large, somewhat kidney-shaped nucleus and two contractile vacuoles. The surface is lightly striated longitudinally. In the posterior end is an anus, from which particles were observed at times to pass. The anterior end is more pointed than the posterior and more tapering. As many as 200 of these infusoria have been found in each drop of the fæces. The parasite is capable, when present in large numbers, of causing severe chronic diarrhœa. The study of sections of the intestine, from a recent fatal case, shows the parasite all through the mucosa and passing through the muscularis and submucosa; some of the sections show the parasite lying along the intermuscular septa of connective tissue in nests and penetrating for a short distance between the muscular layers. There is an extensive eosinophilia in the mucosa, muscularis mucosæ, submucosa, and lymph follicles; this process seems more marked in the submucosa. The mucosa shows areas of necrosis and of hemorrhage, with cellular infiltrations and desquamation of cells. In the submucosa there are also infiltrations of cells. These cells consist of lymphocytes, eosinophiles, and a moderate number of plasma cells. The vessels are all injected; many of them seem considerably dilated and their number increased. Many of the veins contain the parasites, and about some of these small hemorrhages and infiltrations with cells have apparently occurred. The lymph follicles are swollen. These changes occur in the large intestine and in the ileum of the small intestine.

The parasite has generally been regarded as an almost harmless one, but from the clinical symptoms and lesions found at necropsy, in our recently reported case, Johns Hopkins Hospital Bulletin, 1901, we cannot take this view of it.[1]

Henschel has recommended for the treatment of the disease the employment of enemata of acetic acid, grams 50, with tannic acid, grams 5 to 2,000 cubic centimeters of water. Ortman has used quinine enemas 1 to 1,000, with good results. In our case, which was, however, one of severe infection, neither silver nitrate nor quinine enemata had any apparent influence over the course of the disease. The parasite is apparently not a very common one, as Mitter (Bietrarg zur kenntniss des Balant. Coli. Kiel Inaug. Dissert.), in 1891, was able to collect only 28 cases from the literature. No mention of any pathological histology is made in this dissertation. Since

[1] Since writing the above we have met with a case infected with the *Balantidium minutum* (Jacoby and Schandinn). The patient suffered from dysentery, but as the *Amœba dysenteriæ* was also present in the stools, the significance of this infusoria can not be stated in this case.

The *B. minutum* resembles the *B. coli*, but it does not measure over 40μ long; the mouth is more prominent, and there is but one contractile vacuole. There is no apparent paddle-wheel movement of the cilia about the mouth when the parasite is in motion. There can be no doubt but that the *B. minutum* is a distinct parasite from the *B. coli*, but as in Jacoby and Schandinn's case it was associated with ankylostoma and strongyloides intestinalis infection, and in our own with *Amœba dysenteriæ*, its significance is still doubtful.

this date de la Chappelle (Finska lak sulskhardl Helsingfors, 1896, 38. 1941, 1951) has reported two other cases in man. Leuckart has found a similar, if not identical, species in the intestine of the hog. Grassi insists that this species is a distinct one.

The diagnosis may be readily made from the microscopical examination of the fæces, where the infusoria are found.

MASTIGOPHORA.

Flagellates.—Three flagellates have been observed. The first flagellate is pear shaped, with a rapidly-moving flagellum situated on the rounded anterior end. It possesses an undulating membrane, which also moves very rapidly and sometimes gives the appearance of one or several flagella. The posterior extremity tapers to a point, attached to which is also often a single though less rapidly moving flagellum. Sometimes forms, apparently identical with these in every way except that they possess no flagellum on the posterior end, have been observed; but, on the other hand, forms with this posterior flagellum have been distinctly made out. The flagellate moves about very quickly, with darting like movements. It is capable of changing somewhat its outline and of pushing out short pseudopodia. It does not generally measure over 14 or 15μ.

The second is smaller than the first described. It is sometimes a little larger, or may even be a little smaller than a red-blood corpuscle. Its shape is generally round, but at one point on its diameter is a protrusion which slightly tapers to a point. We have been able to make out but one flagellum. It revolves continually when it is in motion, and moves about over the slide in this way; but its movements are not darting or nearly so agile as in the first variety.

The third variety is somewhat pear-shaped. The rounded anterior end presents a distinct cup-shaped excavation. On the lateral margins of the excavation are two flagella, extending downward along the sides of the parasite. On the lower edge of the cup-shaped area are two more flagella also extending downward. The posterior end is somewhat drawn out to a point and also possesses a pair of flagella. Situated in the upper portion are two round bodies resembling a double nucleus, connected by a narrow band. It is usually a little larger than the first variety in size, measuring about 16μ in its greatest diameter. Its movements in the fæces are sometimes sluggish, or it may be perfectly quiet, when its structure can more easily be made out. This flagellate is apparently identical with the *Megastoma entericum* of Grassi, except that we have observed only two flagella instead of four on the posterior lip of the excavation. It is probably the same flagellate that Lambl observed in 1859 and called the "*Cercomonas intestinalis*," thinking that he had seen the same parasite that Davaine had named in 1854 "*C. hominis.*" This fact probably led to the statement of Butschli and Perroncito that the *Megastoma entericum* and the *Cercomonas intestinalis* are identical.

The second flagellate that we have mentioned is probably identical with the *C. hominis* of Davaine, while the first resembles the *Trichomonas vaginalis* of Donné, with the exception that at the rounded end only one instead of four flagella have been observed.

Donné's description was made in 1837, and we think that perhaps the one flagellum, when in rapid motion, might have been mistaken for several. When the parasite becomes attached to an epithelial cell, the single flagellum of the first variety we have described can be definitely seen.[1]

We shall not attempt to identify further these three protozoa with the large number and many indefinite flagellates described by other observers. Both the nomenclature and descriptions of the mastigophora found in man need careful revision.

The first of these flagellates has been encountered in 262 cases. In 137 of these it was the only parasite found present in the stools; in 78 it was associated with *amœba dysenteriæ* alone, and in 10 it was found with this parasite and the second variety of the flagellates described. In 21 cases it was found with the second or third variety alone. In 3 cases it was found in connection with *Amœba coli*. In the remaining number of cases it was associated with other intestinal parasites. Evidently it is a very wide-spread and common invader of the intestine.

The second and third flagellates have been encountered 62 times in the stools; 42 and 20, respectively. In 21 cases they occurred either singly or together and in the remaining number with other intestinal parasites.

All of these flagellates have been found in greater numbers in dysenteric and diarrheal stools. They are also found in the soft stools of individuals with appar-

[1] If, however, other observers insist that four flagella instead of one exist on the rounded end of the *Trichomonas vaginalis*, our first flagellate is not only not identical with it, but can not be placed in the family *Trichomonaidæ*.

ently no intestinal disturbances, particularly in the stools of children. It is not unlikely that they may, when present in large numbers, cause some intestinal irritation, perhaps by their mechanical movements.

CESTODES.

Of the *Tænia*, only two of the adult forms have been observed. *T. saginata* and *T. solium* both exist. The former is the one most frequently seen in our soldiers; the latter occurs occasionally in the natives, who eat a great deal of uncooked pork. Only very brief descriptions of these parasites will be given, as no particular investigations have been made in regard to them, except that their occurrence has been noted.

Tænia solium.—*T. solium* (pork tapeworm) may attain a length of from 2 to 3.5 meters; the number of segments may reach 850. The first proglottides or segments are short, but their length increases from the head downward, and may eventually slightly exceed their width. About 130 centimeters below the head, the segments become mature and measure about 1 centimeter long by 7 to 8 millimeters wide. Their corners are rounded. The segments possess both male and female generative organs. The uterus consists of a median tube with not over 14 (generally from 7 to 12) lateral branches, which are widely separated. The sexual opening is near the posterior border, and may be on either side; that of the female is located just back of the male orifice and in the same sexual cloaca. The testicles appear as numerous small vesicles. The ovary is double. The vagina widens into the seminal vesicle, which passes to form the so-called "globular body." The uterus is at first a straight canal situated anteriorly. When the eggs enter the uterus from the globular body, its lateral branches grow out and become filled with eggs.

The neck is small, filiform-like and measures about 3 centimeters in length. It is surmounted by the head, which is small and spherical, and contains 4 ring-shaped suckers. Between these, the crown of the head is surmounted by a ring of short hooklets, usually numbering from 24 to 27 and arranged in a double row. The parasite attains its full growth in from three to three and one-half months. The eggs measure from .03 to .035 millimeter in diameter; they are round, brownish or yellow in color, and possess a thick shell which is covered with fine, closely-placed spicules. In the complete egg, outside the shell, is an albuminous layer which contains small nuclei and which represents the vitelline membrane. Each ovum contains an embryo, provided with 6 hooklets. When these ova are taken into the stomach, either of man or of the pig, the shell is dissolved and the 6-hooked embryo passes from the stomach, or through the bowel wall, and may work its way into the viscera, muscles, connective tissues, brain, or eye. The symptoms of infection with *T. solium* are usually gastro-enteric and nervous. The diagnosis may be made by an examination of the stools of infected individuals. The ripe proglottides are discharged singly or in chains. The ova are often also found in the fæces. The arrangement of the uterine convolutions, as well as the head, serve easily to distinguish the parasite from *T. saginata*. Tænia solium inhabits the small intestine, where its head is often well protected beneath the valvulæ conniventes. Tapeworm segments should be burned. Pork that has been in cold storage for over three weeks is generally safe to eat. If the pork is thoroughly cooked there is no danger of infection.

Treatment.—The drugs most recommended are male fern, pepo, and pomegranate. Their administration should be preceded by light diet and saline cathartics and followed by purgatives. Unless the head is brought away the cure is not successful, the parasite begins to grow, and after a few months the segments begin to reappear in the fæces. This parasite is often more difficult to expel than tænia saginata.

Cysticercus cellulosæ.—No case has been observed here in man, though this condition has been encountered on a number of occasions in slaughtered pigs, and occurs not infrequently in these animals here. As has been stated above, when the ovum of *tænia solium* is taken into the stomach of man or pigs, the embryo is set free and wanders through the bowel wall. An individual infected with *tænia solium* may infect himself with the ova of this parasite by means of his fingers, and thus become the intermediate host, which is the rôle generally played by the pig.

It has been suggested that by vomiting and retching the mature segments may pass from the intestine of one affected to the stomach of the same.

The freed embryo, having reached a resting place in the viscera or tissues, undergoes various changes, and in from a few weeks to months has formed a small cyst, generally measuring from 8 to 10 millimeters in diameter. From the wall of this cyst there grows into the interior a scolex; from the latter a new tapeworm head develops and a sac forms around it. The scolices possess the head, hooks, and suckers of the *tænia solium*. About these cysts there are usually evidences of a slight inflammation. Their pathological significance depends upon their number and situation. In

the brain and eye they may give rise to serious trouble, though not always when present in these situations do they give rise to alarming symptoms. Pork infected with these cysts is said to be "measly." Man, after eating measley pork, becomes infected with *Tænia solium*. According to Professor Osler, except when the cysts are present in the eye, the diagnosis of *Cysticercus cellulosæ* can rarely be made.

Tænia saginata (*T. mediocanellata*—beef tapeworm): Measures from 4 to 7 meters in length. It may possess over 1,200 segments. Its proglottides are broader and thicker than those of *T. solium*. The mature segments measure from 14 to 18 millimeters in length and from 10 to 14 millimeters broad. The segments increase gradually from the head to about the middle of the parasite, then they become longer but thinner.

As in *T. solium*, each segment represents a separate animal, and possesses all the organs except the brain. The uterus, when fully developed, lies in the middle of the segment and is straight; it possesses from 25 to 39 lateral branches, which are very closely placed and do not generally show the tree-like branching seen commonly in the *T. solium*, but its branches divide more often dichotomously. The sexual pore opens usually at the side as a small papilla, but may open, rarely, on the flat surface. The testicles are numerous and join with the single penis. The vagina extends inward behind the spermatic chord.

The head is flat and not so delicate as in the *T. solium;* it is unarmed and possesses no rostellum or hooklets, but 4 sucking disks are present. It sometimes shows slight pigmentation. The ova are often a little larger than the eggs of the *T. solium*, but it is generally very difficult to tell the ova from one another. The eggs or segments when ingested by cattle give rise to the embryos which pass chiefly to the muscles of mastication, tongue, and heart and there form cysts similar to those which *T. solium* forms in the hog. The cysts of the former are, however, somewhat smaller than those of *Cysticercus cellulosæ*, measuring about 7 millimeters in length and about 3 millimeters wide. Beef containing these cysts is said to be measly. The cysts, if left undisturbed, eventually caseate and later calcify.

The *Tænia saginata*, as *T. solium*, gives rise in man to intestinal, nutritional, and sometimes reflex symptoms. As a rule the disturbances are not marked in otherwise healthy individuals infected with either parasite. *T. saginata* also inhabits the small intestine of man. The diagnosis of infection may be made when either the segments or eggs are found in the stools, though if the eggs are alone found one can not be sure whether *T. saginata* or *T. solium* is present in the small intestine.

Cold storage usually kills the cysticercus of *T. saginata* in beef in four days.

The cysticercus of *T. saginata* appears not to occur in man.

The treatment of individuals infected with this parasite is the same as described under *T. solium*.

Tænia echinococcus.—Inhabits the upper portion of the small intestine of the dog, with the exception of the first 10 to 15 centimeters below the pylorus. It is the smallest *Tænia* of the domestic animals, and often occurs in large numbers in them. According to most observes, it usually measures not over 4 to 5 millimeters long, though Deffke gives the length at from 5.5 to 9 millimeters.

According to Leuckart, the parasite possesses only three or four segments, of which the last one is mature and exceeds all the rest of the body in size.

The hooks are from 30 to 40 in number, and have stout, root-like processes which form two rows, the inner being the larger. Behind the circlet of hooks are situated four suckers. The eggs are round, and in the last segment number about 500. They have a chitinous covering. When the fourth segment is passed, its tissues decompose and the eggs are set free.

Either the eggs or proglottides, when ingested by man, or by pigs and certain other animals, are capable of causing echinococcus disease therein. On arriving in the stomach, the chitinous coat is dissolved and the embryo pushes its way through the gastric or intestinal walls. Leuckart has found them in the portal vessels.

As the liver is the organ most often affected by echinococcus cysts, and as the parasite has not been found in the lymphatics or wandering through the connective tissue, the blood vessels are perhaps their most common means of transmission to the various parts of the body. The embryos, on reaching their destination, which usually occurs in pigs about four weeks after they are fed with the proglottides of *Tænia echinococcus*, form small cysts which soon measure 1 millimeter in size. These cysts are capable of no motion. They continue to grow and after about three weeks may be as large as a walnut. The early cyst consists of a thick external, transparent covering, inclosing granular material. After a time, fluid begins to accumulate in the interior, and the exterior layer becomes slightly lamellated. A lining membrane begins to appear just inside the external layer. In this inner membrane, granules and cells and sometimes muscle fibers may be seen.

The lamellation of the external layer now becomes more marked and remains so, only it increases in thickness with age. This lamellation of the cuticular layer was always supposed to be a characteristic feature of all echinococcus cysts, but Carey and Lyon have recently shown in a primary undoubted echinococcus cyst of the pleura that this lamellation does not always occur in echinococcus cysts and hence is not absolutely characteristic of all of them. Gradually, outside of the cyst a capsule of connective tissue is formed.

While the above changes are going on, small elevations are formed on the germinal or internal layer. According to Naunyn, they are ciliated. This is the first step in the formation of the so-called "brood capsule." A cavity is gradually formed inside of them and becomes bounded by a delicate membrane; outside this layer, another cellular layer is formed. The arrangement of the layers suggests that the brood capsule may represent an invagination of the mother cyst. The brood capsules at times show active movement. The formation of the scolex begins as a thickening of the wall of the brood capsule. It gradually grows externally as a club-shaped process, still having in its interior a canal which connects with the interior of the brood capsule. At the bottom of the distal portion of the club-shaped process the hooks are formed; they first appear as bundles of prickles arranged in rows. Later the prickles disappear, except the foremost rows. The suckers are also formed here. After a longer time, muscle fibers and calcareous particles also appear. The head gradually becomes inverted into the cavity of the brood capsule, the walls covering its head become united to the hollow process, and the scolex is thus fixed to the interior of the brood capsule by a slender stalk (Leuckart).

In this way, many heads of different ages may come to lie in one capsule. In the enlarged cysts the inclosed capsules may number many thousands. The scolex resembles now a vorticella and the head has been observed at times to exhibit slight movements. The booklets resemble somewhat those of the adult worm, only they are smaller.

The above description applies to the simple unilocular echinococcus cyst, or the so-called *echinococcus veterinorum*, which occurs more frequently in animals and is less common in man.

In the unilocular cyst, however, still another more complex process, viz, the formation of daughter cysts may occur. These consist of secondary and completely separated cysts, which may lie inside the primary cyst (endogenous type), or outside the primary cyst (exogenous type).

The endogenous type (*Echinococcus hydatidosus* Leuckart) is the one which usually occurs in man. The scolices may become vesicular and transform themselves by a similar process as in the brood capsule, or the condition may be brought about by infoldings of the parenchymatous layer. In either way, separate daughter cysts are formed which lie within the parent cyst and correspond to them in structure. They may also give rise to scolices and booklets. These daughter cysts may give rise by the same processes to granddaughter cysts (either endogenously or exogenously), and so on for several generations.

The exogenous type, less common in man, has been termed *Echinococcus simplex*, *E. granulosus* (Leuckart), etc. In this form the secondary cysts probably arise from the parenchymal layer. A peculiar variety of the exogenous type is the *E. multilocularis* (Virchow). It is usually found in the liver of man and may be small or occupy almost the whole lobe of the liver. Sections show a thick fibrous capsule and an internal honeycombed structure, the partitions being marked off by fibrous bands, which form by their meshes a number of small cavities. In these cavities are one or several gelatinous masses which represent degenerating hydatid vesicles. Often large cavities filled with exudation products and decomposing material are found in the liver in this form. The changes are supposed to be due to the growth of the brood capsule into the lymphatics, blood vessels, and bile ducts of the liver. These cysts may be sterile, but sometimes contain scolices and booklets.

In man, the liver is the organ most commonly affected with hydatid cysts. The other organs, named in order of their relative frequency of infection, are the intestinal canal, bones, heart, and blood vessels. The cysts may occur in other organs and tissues.

Two cases of echinococcus cyst have been observed here in man, both at necropsy.

In the first case there existed a unilocular cyst, measuring 3 by 4 centimeters, and situated on the right lobe of the liver, and one in the omentum, measuring about 9 centimeters in diameter, with its walls adherent to the pylorus and duodenum. The cyst in the liver was degenerated; its walls were thickened and contained calcareous particles. In the interior was a yellowish, putty-like mass with a few gelatinous shreds. Microscopical examination showed cholesterin crystals, but no scolices or booklets were found.

The cyst of the omentum contained clear yellowish fluid and a number of small gelatinous bodies (daughter cysts), measuring about 1 centimeter in diameter.

The characteristic lamellation could be observed in the cuticular layer of these cysts, and hooklets were also present.

The second case was observed during my illness, by one of my assistants, Hosp. Steward W. E. Musgrave, M. D.

This cyst was about the size of a walnut and also situated in the right lobe of the liver. Hooklets were found in this case by Contract Surg. J. J. Curry.

We have not seen the adult tænia echinococcus, and our description of this parasite follows, chiefly, that of Leuckart.

Treatment.—Medicines are of no value in the treatment of echinococcus cysts. A large number of the small cysts eventually calcify and become harmless. Operative measures are to be recommended when the cyst is large or likely to give trouble. Injection into the sac has given no good results. The cysts may be aspirated for confirmation of the diagnosis. The results of the Australian surgeons show that a large number of the cases recover after operation. During the seven years ending December 31, 1894, at the Adelaide Hospital, South Australia, 121 operations were performed on hydatid cysts, situated in the great cavities of the body. There resulted 101 recoveries and 20 deaths, a mortality of 16.5 per cent.

NEMATODES.

Ascaris lumbricoides.—The *A. lumbricoides* is the most common of the nematodes here. The female measures from 16 to 35 centimeters long; the male from 15 to 25 centimeters. The breadth usually measures 5 or 6 millimeters. Both sexes are cylindrical in shape and taper toward the ends, though the tapering is more gradual toward the cephalic extremity. In color they are yellowish-brown, reddish-brown, or pinkish. Their surfaces are glistening and striated transversely. Several bands, running longitudinally, can sometimes be made out. The parasite possesses three lips. The tail of the female is straight. That of the male is slightly curved anteriorly and possesses two small spicules. On the anterior surface of the curve a large number of papillæ may be seen. The vagina of the female opens ventrally about one-third of the length of the parasite from the head. The anus opens at the tip by a transverse slit. The parasite sometimes gives off an irritating substance, which is noticeable to the sense of smell. To this substance, Peiper, of Griefswald, has attributed the nervous symptoms sometimes noticed in persons infected with the parasite.

The ova measure 0.075 millimeter long by 0.060 millimeter wide. They are usually ovoid, but may be spherical, Their color is yellowish-brown or brownish-red. Their margins are uneven and wavy. The shell is double and surrounded by an albuminous covering. The contents of the ovum have a granular appearance. The eggs are resistant to drying and freezing. Davaine has shown that the dried ova may retain their vitality for over five years. The eggs require no intermediate host, and the transmission to man is direct. Eppstein states that the round worm attains sexual maturity in from ten to twelve weeks after ingestion of the eggs. Man is primarily infected generally through drinking water, or through uncooked vegetables, salads, etc. As the transmission is direct, he is capable of reinfecting himself whenever the ova, which are found in large numbers in the faeces, are carried by the fingers to the mouth, and which might happen with uncleanly persons when the fingers are soiled at stool. The parasite has caused considerable annoyance to regimental surgeons here, particularly among the volunteer regiments. Sometimes almost half of the command has been found to be infected with these worms.

The chief symptoms observed in the infected cases among our troops have been gastro-intestinal ones, the men very frequently vomiting large numbers of the worms.

The parasite has been usually found at necropsy in the upper portion of the small intestine, though sometimes in the large intestine. The diagnosis can be made by a microscopical examination of the stools in which the ova are present, or the round worms themselves may appear in the stools.

The cases usually readily yield to treatment with santonin.

Oxyuris vermicularis.—Several cases of infection with this nematode have been observed. The female measures from 9 to 12 millimeters in length, and about 5 millimeters broad. The male is generally smaller, measuring not over 5 millimeters long. The head of both sexes is pointed. Protruding on each side from behind it, there is a swelling, lighter in color, and extending somewhat like a balloon, on each side of the œsophagus for a short distance. There are three small lips. The female is easily seen with the naked eye, and looks not unlike pieces of fine thread. The body is tapering for a short distance behind the head, to its awl-shaped tail. The anus opens at the base of the tail. The vagina opens ventrally just above the anterior half of the worm. The tail of the male is blunt and often curved spirally; it possesses only one spicule.

The ova measure about 50μ long by from 24 to 29μ broad. They are somewhat elliptical in shape, but one surface is curved and the other somewhat flattened. There is a thin albuminous covering to the shell. The eggs are not killed by drying. The transmission to man is direct. Individuals may reinfect themselves with their fingers, which have become infected with the ova in scratching.

The adult parasites inhabit the lower portion of the small and the large intestine. The male usually dies after fulfilling its sexual function, and is rarely found near the rectum. The female, after becoming impregnated, passes toward the rectum. The diagnosis may be made by finding the females in the rectum, vagina, or feces. The ova have occasionally been observed in the feces of those infected. The symptoms observed have been chiefly pruritis ani, with a resulting local dermatitis. The attacks of itching come on particularly at night.

Infection probably does not occur through drinking water, as Zenker has shown that in water the ova perish quickly. Uncooked fruit and vegetables, and the hands of infected individuals are, probably often, the primary means of infection.

In the treatment of cases infected with this parasite, it is to be remembered that the sexually mature forms are to be found in the small intestine and cæcum. Doses of santonin and rhubarb by the mouth, and enemas of quassia, aloes, or turpentine, are usually successful.

Barbagallo has recently recommended senna leaves, 15 grams; water enough to make a decoction of 80 grams; then add sodium sulphate, 8 grams; simple sirup, 20 grams. Mix, to be taken in two doses, one day intervening.

Trichocephalus dispar.—The *T. dispar* is a very common parasite in Manila, judging from the number of times the ova have been found in otherwise apparently normal feces. It measures from 35 to 50 millimeters long, the female being a little larger than the male. The anterior portion is long and thread-like and contains the œsophagus. It expands rather suddenly into the posterior portion which contains the genital organs. The posterior extremity in the male is curved spirally and is surmounted by a single spicule. The vagina opens near the beginning of the posterior portion; both it and the uterus are filled with eggs. The parasite is striated transversely.

The eggs are oval in shape and their color is brownish. The shell is thick. It does not extend completely around the egg, but is deficient at the poles of the oval; here project two peg-like protrusions, which are of a lighter color than the rest of the egg and shell. The ova are possessed of great resisting powers. They may be frozen or dried without losing their vitality.

The transmission to man is direct. The embryo while still in the ovum is taken into the human stomach, where the shell is dissolved and the embryo liberated. The usual situation of the parasite is in the cæcum, or large intestine. Usually it lies loose in the bowel; sometimes the mouth appears fastened to the mucosa. Some observers have stated that the parasite is a blood-sucker and capable of causing considerable anæmia. Our experience has not been that with it, but we have not encountered any cases of severe infection with this parasite as yet.

The diagnosis may be confirmed by finding the ova in the feces. The treatment is most unsatisfactory. Thymol, given in almost toxic doses, usually has no effect in expelling the parasite. Male fern and santonin are also generally useless. Fortunately there are no unfavorable symptoms in mild infections.

Trichina spiralis.—No case of trichinosis in man has been encountered by us here, but muscle trichinæ have been observed on a number of occasions in Manila hogs, so that it may be safely stated that trichinosis exists here, particularly in the natives, who raise and live intimately with large numbers of pigs, and who eat considerable pork.

The muscle trichina (larval form of *T. spiralis*) measures from 0.7 to 1 millimeter in length. It is cylindrical, tapering anteriorly until the extremity is quite thin and where the mouth opens. Posteriorly, it is larger and the extremity is rounded off; the anus opens here. The œsophagus is long and is surrounded with large cells on both sides. The sexual organs occupy the ventral portions of the posterior half of the body, and the sexes can often be distinguished. The parasites lie coiled up in a sort of cyst between the muscular fibres. The cysts are oval, with generally two projections at the poles. The capsule of the cyst is chitinous, and in the older ones laminated. A single cyst may contain one or several trichinæ.

In stained sections about the trichina, the muscle often stains poorly and the transverse section is indistinct or lost. In places, breaks in the muscle fiber occur. The muscle undergoes granular degeneration, while the muscle nuclei are greatly increased in numbers. Near the poles of the cysts are numerous lymphocytes and epithelioid cells. The eosinophiles are increased in number about the parasites, and often the large mono-nuclear cells show also an apparent increase.

Though we have observed no case of trichinosis in Manila, as the parasite certainly

occurs here, it may be well, from observations made elsewhere, to say a word in regard to the adult *trichina spiralis*, which may occur in the human intestine.

If a piece of meat containing the above-described cysts and embryos be eaten, the cysts are dissolved in the stomach and the parasites liberated. They quickly complete their development and copulate. The female gives birth to young trichina in about seven days after infection. The embryos are already hatched from the shell before they pass from the uterus. They soon penetrate through the intestinal wall, and finally come to rest in the muscular or other tissues, where they gradually become encysted.

The full-grown female measures from 3 to 4 millimeters in length, and resembles a small piece of white hair; the male is considerably smaller, generally not measuring over 2 millimeters. The dorsal extremity of the latter is provided with two conical-shaped pegs, which resemble somewhat an open pair of pincers; their use, apparently, is to fix the female in copulation. The pegs are separated by several papillæ. There is no spicule, but the cloaca is pushed out in copulation. The alimentary canal begins with a mouth, which appears as an intestine. It increases in caliber and passes into the general food canal. This is surrounded throughout the whole length by so-called "cell bodies," i. e., by rows of large cells, which are quite distinctive.

The stomach is represented by a flask-like dilatation and is covered by fine granular cells. It passes into the intestine which opens in a cloaca, together with the seminal duct at the posterior extremity. The testicle is represented by a pouch, situated near the posterior end. The male dies usually shortly after copulation.

In the female there is situated in the posterior extremity a pouch which represents the single ovary; it passes anteriorly into the single ovarian tube, which terminates in the vagina, about a quarter of the length of the parasite from the anterior extremity. The eggs develop within the uterus.

The diagnosis is rarely made by finding the adult trichinæ in the stools. They are short-lived and perhaps are often digested and destroyed. According to other observers they disappear from the intestine in from three to eight weeks. The details of the clinical symptoms in diagnosis can not be gone into here, but the recent important work of T. R. Brown, on the blood changes, deserves special mention. This observer has shown that a marked leucocytosis occurs, in which there is an extraordinary increase in the number of eosinophilic cells. These cells may form 68 per cent of all the leucocytes. This very important symptom may suggest the diagnosis. The work of Brown has been confirmed by Professor Osler, Blume, Cabbot, Kerr, Gordiner, and others. If the diagnosis has been made shortly after infection, the bowels should be thoroughly evacuated and kept loose; calomel has been particularly recommended. Glycerin, male fern, santonin, and thymol, have all been recommended for destroying the intestinal parasites. No medicines have any influence upon the embryos after they have passed through the intestinal wall.

Filaria.—But one case of filariasis has been observed. This patient had been living in Iloilo for the past two years. Dr. Maye, an English physician who has resided in Iloilo for a number of years, tells of two cases of undoubted chyluria which occurred in natives in Iloilo, who had also never been away from that place.

Our case was infected with *Filaria nocturna*. The embryo measured about 0.35 millimeter long, by 7.5 μ wide (photomicrographs showed it to be about the diameter of a red blood corpuscle in width). The posterior end is rounded off rather abruptly, while the anterior tapers gradually to a fine point. The nematode is inclosed in a sort of sheath which, though closely applied laterally, is longer than the parasite, and a clear space can be seen above and below the true body.

Manson has described a shiny, triangular V-shaped patch, situated about one-fifth of the entire length of the organism backward, and a second similar though smaller spot situated a short distance from the tail. He also states that the head possesses a six-lipped and very delicate prepuce. The V spots and lips are sometimes very difficult to observe in fresh specimens. The fresh embryos have a granular appearance. These embryos were not found in the blood of our patient during the day; they began to make their appearance in small numbers about 6 o'clock, and were most numerous in the blood specimens collected near midnight. The patient suffered from lymphatic swellings in the right groin and complained of pain in the right abdominal region. There was no chyluria present. He had irregular attacks of fever which lasted for a few days at a time, and in which his temperature sometimes registered 104°. An examination of his blood showed no malarial parasites; there was no leucocytosis present. A differential count showed, polymorphonuclear leucocytes, 64 per cent; small lymphocytes, 26 per cent; large and transitional forms, 7 per cent; eosinophiles, 3 per cent.

The adult parental forms of *Filaria nocturna* (i. e., *Filaria bancrofti*) measure, according to Manson, 94 millimeters in the female and 70 millimeters in the male.

They are generally found together in pairs and sometimes in groups of 6 or 7 coiled together. The males are more active and have their tails spirally twisted, as a vine.

They possess two spicules of unequal length, from which spring delicate wavy threads. The extremity of the tail in both sexes is blunt. The head is club-shaped and the mouth terminal and simple.

In the female, the uterus is double and the vulva opens a short distance behind the mouth. The alimentary canal is also simple. The embryos are born in the lymph and, passing through the thoracic duct, enter the blood. The females of certain species of mosquitoes may act as the intermediate host of this parasite. These insects, in sucking the blood of an infected subject, receive also the embryonic filariæ. The latter pass to the stomach of this host and then escape from their sheathes. They next bore their way through the stomach wall and enter the thoracic muscles. After a passive larval condition, they begin to grow with great rapidity. According to Manson, they become furnished with a mouth, an alimentary canal and a three-lobed tail. About this time the mosquito deposits her eggs and, he conjectures, probably falls into the water and dies. The filariæ then escape from the dead bodies of the mosquitoes into the water and in this medium, he supposes, they pass into the stomach of man. Here they bore through the tissues and reaching the lymphatics attain their sexual maturity.

Very recently, however, C. G. Low, in a study of filariated mosquitoes (*Culex pilariensis*), has found the filariæ passing into the proboscis of the mosquito. He states that the parasite does not pass along the salivary duct, but makes an independent passage through the base of the labium and the hypopharynx. He thinks that it seems fair, therefore, to conclude that when the mosquito bites, the filaria finds its way into the human body along the proboscis.

Still more recently, however, Grassi and G. Noe have insisted that the filariæ are not free, as shown in Low's drawings, but are still inclosed in the prolongation of the general body-cavity within the labium. These authors further claim that the embryo does not pass to man in the way that Low has described, but by a different mechanism, viz: that in biting, the labium of the anopheles is bent, and, being stuffed with filariæ, the integuments of the labium are ruptured along the dorsa groove and through the rupture thus produced the filariæ come out to penetrate the body of their host. By a large number of experiments, they have shown that *Anopheles claviger* may become infected with filaria after biting a dog which is already infected with this parasite. Other healthy dogs become infected when bitten by these anopheles in turn, the filariæ passing from the mosquito into the circulation of the dog, as stated above. This, then, seems to be the probable mode of infection in man.

In regard to the treatment of the disease, no drug, so far as known, will destroy the embryos in the circulating blood. Austin Flint has, however, reported a case of chyluria cured with methylene-blue, 2 grams every four hours for five days. The surgical treatment, particularly the removal of the adult parasites from the enlarged lymph glands of the groin, is sometimes, though not always, successful in producing a cure.

The prevention of filarial disease consists in using drinking water not contaminated by mosquitoes, and in sleeping under mosquito nets. It is to be remembered that patients suffering from filariasis, particularly in hospitals, are to be regarded in the same light as those suffering from malaria, viz, as dangers to the community. Such cases should be isolated and kept under mosquito nets when mosquitoes are about.

Filaria cervina is not uncommon here in the abdominal cavities of cattle, and intra-ocular filaria (probably *papillosa*) occurs in the horse.

The Ankylostoma duodenale.—This nematode often gives rise to grave disturbances, and is not infrequently encountered here.

The male measures from 6 to 10 millimeters in length and from about 0.5 to 1 millimeter in breadth; the female is from 6 to 18 millimeters in length and is occasionally a little thicker than the male. They are grayish-yellow or grayish-red in color, or when filled with blood, they may be much swollen and dark-red in appearance. Generally, with the naked eye, about one-third the length of the body from the head, the beginning of the intestine may be distinguished by its darker color; particularly when the parasite contains much blood is this well marked off.

Microscopically, the cephalic extremity is generally bent dorsally. The mouth opens on the ventral side and contains six hook-like teeth, four in-curving and placed ventrally and two conical and placed dorsally. The œsophagus is cylindrical and somewhat vase-shaped, with a longitudinal cleft; its inferior extremity is rounded. Following the œsophagus comes the intestine. Two longitudinal bands of muscle extend downward on each side of the intestine. The surface is striated longitudinally. The parasites usually contain blood pigment and red-blood cells.

The female, which is three or four times as frequent as the male, may be distin-

guished from the latter by its caudal extremity, which is tapering and somewhat awl-shaped. The vulva lies behind the center of the body. It, also, is larger and contains more blood than the male. The caudal extremity of the male is dilated and forms the bursa copulatrix, which consists of a threefold fan-like apparatus from which issue two very fine, thread-like spicules, which represent the penis.

The adult parasites are not generally found in the stools, unless the patient has undergone treatment with an anthelmintic. The ova, however, are found in the fæces of those infected and give evidence by their numbers of the severity of the infection. The eggs are oval and measure about 45 to 68μ long and from 25 to 38μ broad. When seen in the fæces, they are already partially segmented into two, four, or eight cells; sometimes, but rarely, they show here further segmentation. The shell is transparent and there is a clear rim between the segmenting yolk and the shell. After three or four days under favorable circumstances the larvæ are hatched, and they then have the typical rhabditis form and resemble the embryos of the *Anguillula intestinalis*; though they are somewhat smaller then, and the œsophagus is relatively somewhat longer. The ankylostoma embryos are never found in the freshly passed fæces, however.

We have not been able to confirm the recent work of Giles, that the parasite represents an example of dimorphism or heterogenesis. The embryonic forms we were able to obtain soon died without further development. Cases of combined infection with the *Anguillula intestinalis* and the *Ankylostoma duodenale* are not uncommon, and it is possible that the adult, free-living generation of *Anguillula intestinalis*, or other free nematodes occurring in the culture media used might be mistaken for and as representing the parent stage of the free-living generation of *Ankylostoma duodenale*. However, it is only fair to state that Giles has apparently excluded these contaminations. His material seems to have been very abundant and his experiments carefully performed. Few have probably given this work the attention that he has done. At the same time, granting that the parasite has an adult free stage, it is probable that the transmission to man may often be direct.

The ova of the ankylostoma have been recorded present in the stools of 46 cases (on five occasions associated with other parasites). In the majority of these cases, the adult parasites have been found in the dejections after treatment with thymol. In addition, the adults and ova have been found in the intestine in eight cases at necropsy.

The patients with very mild infections may present no noticeable symptoms. With severe infections there has always been considerable anæmia. In one case of severe ankylostomiasis and concurrent typhoid infection, which later came to necropsy, the red-blood cells counted only 2,800,000, the hæmoglobin registered 40 per cent. and the white cells numbered 8,000.

The anæmia resembles clinically and in its blood-changes the usual changes seen in advanced, secondary, or chronic anæmias, with the exceptions that the leucocytes are sometimes relatively increased, the eosinophiles generally more numerous, and the percentage of hæmoglobin generally relatively lower. The parasite extracts the fresh blood through the mucosa, and the anæmia is generally in proportion to the number of parasites present in the intestine. It has been suggested, but not conclusively demonstrated, that the parasite excretes from its skin a toxic substance. Gastro-intestinal symptoms have been frequent. Diarrhea has not been an uncommon symptom; it may be intermittent. The temperature is often subnormal, though there may be slight fever at times.

Sections from the liver, in addition to the very advanced fatty degeneration of the cells, show grains of yellow pigment situated inside the liver cells, which give the chemical reactions of hæmatoidin. Daniels first noticed the occurrence of these granules and thought that they might represent the result of blood destruction within the vessels, due to some toxic substance produced by the parasite and absorbed from the intestine. To this he attributed the anæmia of ankylostomiasis. Rake, however, in 1894 concluded from a chemical estimate of the amount of iron found in the liver in five cases of ankylostomiasis that in this disease the iron contained in the liver is below the normal average, and that the anæmia is due to the direct abstraction of blood by the parasite. However, this yellow pigment may be often very abundant in the sections of the liver in cases of ankylostomiasis.

In none of our eight fatal cases infected with this parasite can the ankylostoma be said to be the sole cause of death, for at necropsy there have always been other lesions present. In two cases of severe ankylostomiasis the lesions of typhoid fever also existed. In neither of these would we have expected a fatal issue from the typhoid infection alone. In one, the temperature had almost reached normal. In both, at necropsy, there was advanced anæmia and fatty degeneration of the liver; in one the heart and kidneys were also fatty, and in the other marked cloudy swelling of these organs existed.

In the eight cases the liver showed fatty degeneration in six, the heart in two, and the kidneys in four. Cloudy swelling was present in the liver in two cases, in the heart in four, and in the kidneys in one.

The diseases the cases of ankylostomiasis were associated with were: Acute lobar pneumonia, 1; amœbic dysentery, 2; chronic parenchymatous nephritis, 1; amœbic abscess of the liver, no lesions of dysentery in the large intestine, 1; cancrum oris, æstivo-autumnal malarial fever, intestinal infection with *Strongyloides intestinalis*, 1; typhoid fever, 2. The infections with ankylostoma were severe and the ankylostoma were very numerous in five and moderate in three.

The parasites were found in the lower part of the duodenum, in the jejunum, and upper portion of the ileum. In all the cases there was intestinal catarrh, proportional to the number of nematodes found therein. In addition to the pallor and small amount of blood in all the organs and tissues, in the severe infections, effusions into the pericardium and abdominal cavity sometimes occurred.

An extract from one of our necropsy records, of a case of severe infection, reads as follows:

Small intestine: Beginning a short distance below the pyloris, the mucosa of the duodenum and of the jejunum is bathed in a considerable layer of mucus. In the lower half of the duodenum and upper two-thirds of the jejunum the mucus is much more abundant, reddish, and mixed with considerable blood. This bloody, mucous exudate is not only covering the mucosa, but considerable of it is lying free in the lumen of the bowel. On removing most of the exudate, the mucous membrane appears often uneven and occasionally distinct islands of more swollen mucosa, surrounded by depressed areas of a grayish color, may be seen. Many ecchymoses are present in and just beneath the mucosa and a few small pigmented patches also exist. Hanging to the wall of the duodenum and upper two-thirds of the jejunum are seen very large numbers (thousands) of the adult *Ankylostoma duodenale*. They are also present, but in much smaller numbers, in the lower end of the jejunum and upper portion of the ileum. Their heads are often buried in the mucosa. Many of them are fastened firmly to the intestinal wall and are not easily washed or brushed away. The bodies of a large number of the parasites are of a bright-red color and filled with blood. In some places the walls of the intestine are distinctly thickened, the mucosa being particularly affected. These regions of thickening correspond generally to those where the intestine contains the most bloody mucus, and to where the ankylostoma are apparently in greatest number. The large intestine, with the exception of the advanced pallor, appears normal.

The sections of the small intestine show the surface of the mucosa bathed in mucus and sometimes swollen. There are many torn villi, or here and there a villus and crypt of Lieberkühn have been destroyed. There is an extensive infiltration of the mucosa, muscularis, and upper portion of the submucosa. The infiltration consists of small round cells, eosinophiles, plasma cells, blood cells, and a variable, though smaller, number of polymorphonuclear leucocytes. With a low power, small red spots may be seen lying in the walls of the crypts of Lieberkühn. Upon examination with higher powers, these are seen to be clumps of eosinophiles, lying three or four together. A number of them show increased diameter and contain swollen, large, red granules, which appear somewhat vesicular. The eosinophiles show a marked increase in the mucosa; they are also increased in number, but less numerous in the upper portion of the submucosa. Tho ova of the ankylostoma are not seen in the tissues and there are no cysts containing the eggs, as seen in the sections of the intestine from cases of infection with the *Strongyloides intestinalis*. Only rarely is an ovum seen, then it is lying free on the surface of the mucosa. The segments of the egg stain a deep purple with hæmatoxylon, while the protoplasm about it and the shell remain perfectly clear and take no stain.

Portions of the adult ankylostoma may be seen cut transversely, lying near the mucosa, or with their heads buried in it. There are frequent small hemorrhages about them. Though in the sections studied no parasites have been found with their heads lying in the submucosa, there are evidences present that the parasite does travel this far, for there are breaks in the muscularis mucosæ and in some of these breaks a portion of the villus has been pushed into the upper portion of the submucosa. There are well-marked infiltrations of cells and small hemorrhages in these regions.

Many of the epithelial cells of the mucosa stain poorly and show cloudy swelling. A large number are swollen and contain large drops of mucin; there are also a number of droplets outside of the cells and lying within the crypts of Lieberkühn. Other cells show evidences of proliferation by the karyokinetic figures seen in their nuclei.

The diagnosis of ankylostomiasis may be made when the ova are found in the fæces.

In the treatment of the disease, thymol is the drug to be most recommended for ridding the patients of the parasite. There is some danger attending its use in the large doses sometimes required. General tonic treatment is often necessary during convalescence.

Cats here are not infrequently infected with the *Uncinaria trigonocephala*.

Strongyloides intestinalis.—This parasite was observed for the first time in North America by the author, in Baltimore, in December, 1897. A review of the literature and a report of the clinical symptoms and pathology of this case and other cases infected with the *Strongyloides intestinalis* was published in the Johns Hopkins Bulletin for 1901. More recent studies have shown that the parasite is not an uncommon one in Manila, we having met with 13 cases of infection with it.

The diagnosis of infection with this parasite may be made by finding the rhabditis forms in the stools. Here they measure from 0.25 to 0.60 millimeter long by 16 to 22 μ wide. In fresh stools they are very active, swimming both forward and backward with eel-like motions, quickly coiling themselves up or again straightening themselves out. They are often found intimately mixed with fæcal matter, which sometimes seems to closely adhere to them. They resemble the ankylostoma larvæ with the exception that they have at first a larger body.

Many of these larvæ, when placed in the stools in the incubator, after twenty-four hours begin to molt and to slip out of their skins; often the forms may be observed half out, and some just slipping out and casting off this outer covering. Their structure can now be more clearly made out. The cephalic extremity is rounded and pierced by the buccal orifice, where may be seen the suggestion of the lips. Following the mouth comes a vestibule, which in the embryo for a short distance undergoes a slight gradual enlargement, and then becomes slightly contracted. This is followed by a swelling or bulbous portion of the œsophagus, which is again narrower. This latter portion of the œsophagus is followed in turn by a second bulbous portion or stomach, which incloses an apparatus for trituration, composed of three chitinous teeth, placed in this form: ($\breve{\vee}$). The stomach is followed by the intestine, which ends in a teat situated at the right side of the animal just above the base of the tail; at times it protrudes slightly and particles are seen to pass from it. Situated on the right side, about one-third of the distance from the bulbous portion to the tip of the tail, may be seen a whitish, somewhat oval-shaped area, which represents the sexual rudiment. The tail is tapering and pointed. On each side of the body in the older forms may be seen, beginning at the bulb of the œsophagus, two longitudinal series of muscular plates placed very closely together. They can only be separated from one another by their nuclei. These embryos are found at necropsy throughout the intestinal tract.

Either one of three things happens to these rhabditis larvæ. They may die after three or four days, they may be transformed into filariform larvæ, or they may develop into the males or females of the adult free form.

Change to the filariform larvæ: The forms which begin to change to this generation have soon much longer and tapering tails, often rolled in a spiral manner. The parasite looks, therefore, thinner. They soon begin to resemble young filaria, to lose the rhabditis form, and to pass to the strongyloid form. The œsophagus loses its chitinous tooth as well as its swelling and first segment and becomes a cylinder which traverses the whole anterior half of the worm and then continues with the intestine. Their edges become slightly wavy. These forms grow no larger, but gradually their tails begin to shorten. If left in the stools, by the end of a week they all die; but if taken into the stomach of man in drinking water or on uncooked vegetables, salads, etc., they grow to the adult parasitic form of the *Strongyloides intestinalis*, which will now be considered.

The adult strongyloid form has the aspect somewhat of a filaria or of a strongyle. It represents the strongyloid form of the dimorphous species of this parasite. The adults are not found in the fæces, except after purges or anthelmintics, or when dead, but inhabit the duodenum or jejunum of man. They measure 2.10 or 2.20 millimeters long by 32 to 39 μ wide. The body increases slightly and gradually in size from the head to about the posterior fourth of the body. It terminates behind rather suddenly in a short tail; the tip of the tail is rounded and even a little dilated. The surface presents a fine regular striation. The mouth is simple and possesses no armature. Following the mouth comes the œsophagus, which is nearly cylindrical, and which occupies nearly a quarter of the length of the parasite and presents no enlargements or swellings. Next to the œsophagus comes the intestine, which could easily be confounded with it but for the change in its color. The intestine terminates itself at the base of the tail by an anus, which has the appearance of a transverse slit. The vulva opens at the posterior third of the body on the side; there is a slight protrusion and a transverse opening; the uterus also opens here in the adult. It incloses five or six eggs of a yellowish, granular appearance, ellipsoid, and measuring 59 by

34 μ. The eggs are often seen segmenting. These forms are apparently all females, yet it is still a question whether they are parthogenetic or whether they are true hermaphrodites.

The free eggs are also often seen in the human intestine. They are oval and resemble those of the ankylostoma, only they are a little larger, measuring from 60 to 70 μ by 37 to 39 μ. They are often joined together in strings of two or three. All stages of segmentation may be observed in the intestine, and the embryos may frequently be seen just issuing from their shells.

If the embryos found in the stools do not become filariform and change to the strongyloid form, they may, as has been stated, become, after forty-eight to seventy-two hours in the incubator, adult males or females of the free living generation. In this generation, when both males and females are present, there are from eight to ten times as many females as males present. The females are the larger and their bodies also taper more in the posterior portion. They measure, generally, from 1 to 1.4 millimeters in length, and from 0.05 to 0.075 millimeter in breadth. In the adult free living generation the œsophagus has the same form as that of the larva, only it has not lengthened itself so much comparatively, measuring now about 0.16 millimeter. Of the three portions of the œsophagus the buccalic is the longest; it measures 99 μ and represents in consequence a little more than one-half of the entire apparatus. The cephalic extremity is rounded and pierced by the mouth, about which one may see on careful examination three or four lips. Following the mouth comes a vestibule, which, for a short length presents a gradual enlargement. It enters the anterior extremity of the œsophagus which juts from its interior under the form of a smooth cone. The vestibule is much better developed than in the larvæ. Following this portion of the œsophagus comes the bulbous or terminal portion, inclosing an apparatus for dentition, consisting of three chitinous teeth in the form of a $\curlyvee$. The intestine of the female is also somewhat longer than that of the male; it ends, as in the larvæ, in a teat at the right side of the body at the base of the tail, and is often a little protruded. On each side of the body, running longitudinally, can sometimes be counted from 16 to 18 cells, which are closely placed, but which can be distinguished from one another by their nuclei. In the female the posterior extremity of the body stretches itself out into a thin, fine tail, often lightly coiled in a spiral. A little below the middle of the body, on the right side, the vulva opens, marked by a slight contraction and giving access to a double uterus, of which the horns extend, one anteriorly and one posteriorly; each of these is terminated by an ovary.

The eggs measure from 45 to 70 μ. They are elliptical, the shell is delicate and the vitellus contains few granules. The eggs are often segmented when laid, indeed they hatch not infrequently in the body of the mother.

The adult free males differ in the following respects from the females. They are shorter and thinner, measuring from about 0.75 to 1 millimeter long by 0.04 to 0.06 millimeter wide. The œsophagus is also a little shorter than that of the female. The caudal extremity measures about 70 μ; it tapers quickly and is curved on itself in a manner quite different from the spiral coils of the tail of the female. Just at the base of the tail one may see clearly two spicules, cone shaped and curved, which represent the penis. In front of the cloaca on the ventral side are two or three small papillæ. The adult forms copulate, and from the eggs of the female the embryos hatch usually within twenty-four hours. The resulting embryos are thin and their tails tapering. They show at first the bulbous swelling of the œsophagus and the chitinous teeth. They soon lose these structures, however, and become more like filaria; that is, they change from the rhabditis to the strongyloid form. If they are now taken into the stomach of man they may grow to form the adult female parasitic strongyloid form; otherwise they soon die. Thus it may be seen that the first and second generation may be quite different morphologically from one another. For this reason they were supposed for a long time to represent two distinct parasites and were described under the names of *Anguillula stercoralis* and *A. intestinalis*. It seems that only the latter is parasitic, and that the former perhaps merely serves to perpetuate the species more effectively.

Microscopical study of sections of the small intestine, cut from the duodenum and upper portion of the jejunum, show in general a catarrhal inflammation with desquamation, and in many places atrophy of the epithelial cells. The solitary follicles are often slightly swollen, and there are often infiltrations of small round cells about the glands. There is usually a moderate increase in the eosinophiles in the tissues which contain the parasites and ova. In sections stained with Unna's alkaline blue, only a few plasma cells may be seen.

The sections show in addition, first, many eggs in various stages of segmentation, some containing embryos, generally lying in the bottom of the crypts of Lieberkühn. In these crypts the epithelium is much compressed and often atrophied. The nuclei

lie at the base of the cell, and about them usually no cell substance can be made out. Some crypts contain as many as two eggs. The epithelial cells then seem considerably compressed and atrophied. About these crypts which contain eggs (particularly when they are segmenting or contain embryos not yet hatched) there are a few round cells. The diameter of the crypts containing eggs or parasites is always considerably larger than the surrounding crypts without parasites. In sections where the egg has burst and the embryo escaped, the epithelium of one side of the crypt has disappeared. About these crypts there are some evidences of proliferation, as evidenced by the karyokinetic figures of the nuclei of the surrounding cells, and the same compression and atrophy of the epithelial cells, with infiltration of round cells about them, exist. In other crypts, the egg rests on the basement membrane of the gland. The epithelium is then either gone entirely or is also much compressed. Not infrequently what appear as small cysts (in transverse sections) are seen lying in the walls of the crypts, resting on the basement membrane. Apparently the eggs have disappeared from these cysts, leaving clear areas. There is no evident infiltration with small round cells about them. Secondly, pieces of the adult female cut longitudinally and transversely, lying in the lumen of the crypt or down beneath the epithelium of the crypt or villus and resting on the connective tissue, which lies between the muscularis mucosa and the blind end of the glands. There are usually infiltrations of small round cells about the parasites, and karyokinetic figures may also sometimes be seen about them, together with round, oval, and spindle-shaped cells. In sections which contain the adult in or near the mucosa, the desquamation of the cells may be marked and many of the neighboring nuclei stain poorly. Thirdly, many of the crypts contain embryos. These crypts show the same flattening and atrophy of the epithelial cells. In some places the cells are entirely absent from the crypt, and at first sight it may appear that the embryos are in the lymph spaces. The sections show sometimes the embryos breaking through the crypts or lying between the epithelium of the villus. There are usually desquamating cells lying about them.

In 1895 and 1896, B. Tessier stated that he believed the *Anguillula stercoralis* gave birth to small embryos which penetrated through the intestinal wall through the breaks in the mucosa and appeared in the circulating blood. He was led to take this view because in a patient which he observed he found the embryos of the *Strongyloides intestinalis* in the stools, and filarial-like embryos in the circulating blood. He concluded that the parasite was hence a facultative hæmatozöon. In careful and repeated examinations of the blood, in our cases of infection with the *Strongyloides intestinalis*, we have never found the embryos in the circulating blood. It is not clear that Tessier's case was not one of combined infection with a variety of filaria and the *Strongyloides intestinalis* and we are inclined to take this view of it.

Our patients all showed diarrhea, which was sometimes moderate and generally intermittent in character; they also in addition often suffered from gastro-intestinal disturbances. There was usually moderate anæmia present. The leucocytes were generally normal or slightly increased in number. Differential counts showed about normal proportions of the leucocytes; the eosinophiles did not number over 2 or 3 per cent.

We have never yet found this parasite in a well individual.

From the clinical study, and particularly from the histological study, of sections of the small intestines from cases infected with this nematode, we can not conclude that the parasite is harmless, while on the other hand it is not a particularly dangerous one to man. We believe it to be capable of causing clinically an intermittent diarrhea with intestinal disturbances, and anatomically a catarrh of the small intestine. It seems quite certain that the parasite, from the positions it occupies in the mucosa and from the changes about the ova, embryos and adults lying in the tissues, may cause particular changes by its rapid mechanical movements. Moderately severe infections probably cause only slight disturbances.

As has been stated, the diagnosis rests upon the presence of the rhabditis embryos in the stools. The eggs and adult females, except after treatment, are generally not found there. In ankylostomiasis, the ova are always present in the stools, and thus the two affections may be easily differentiated.

Treatment.—The milder cases of infection sometimes yield to large doses of thymol, together with purgatives and general tonic treatment. It is often necessary to repeat the treatment at intervals. In very severe infections, neither male fern nor thymol is of any apparent value in ridding the patient of the parasite.

The parasite has also been found here in the small intestine of monkeys, producing apparently the same changes as seen in man.

In perfectly healthy monkeys not previously infected with this parasite, however, we have recently been able to produce successful inoculations by introducing stools containing the embryos of the *Strongyloides intestinalis* into their stomachs.

The monkeys were fed through a stomach tube with a portion of a stool containing the embryos. The diarrhea was generally noticeable after about a week follow-

ing the inoculation. The only difference of moment noted between the diarrhœa in the monkey and in man is in the fact that in the latter the ova are usually found in large numbers in the fæces. These experiments have settled definitely that the parasite is both capable of producing diarrhœa and of bringing about pathological changes in the small intestine.

DIPTERA.

Seven cases of myiosis interna have been observed. The dipterous larvæ have been passed in these cases in the perfectly fresh fæces. The larvæ observed have been those of the *Calliphora vomitoria* (blue-bottle fly), and more rarely of *Anthomyia canicularis* (flower fly).

The latter was found in one case in the fæces of a newspaper reporter who had accompanied our troops on a long march. He had not been particular about his diet, having at times eaten native food.

The symptoms observed in these cases were moderate diarrhœa and occasionally gastric or intestinal pains.

The diptera in the fæces may be easily seen with the naked eye. They measure from 2 to 2½ centimeters in length. Their diameter increases from the anterior or head end downward, so that at the posterior end they are quite broad. Their cylindrical bodies are ringed with generally about ten ribs.

They are apparently easily expelled with ordinary purgatives.

The cases of infection with *Calliphora vomitoria* probably occur from eating meat upon which the ova of these flies have been deposited.

The cases of *Anthomyia canicularis* infection probably occur from the vegetable material of food infected with their ova.

HIRUDINES.

Our soldiers on the march, particularly along the bases of the mountains in the wooded districts, have been troubled considerably at times with leeches.

These parasites measure, before being filled with blood, about 2 centimeters in length and about 4 or 5 millimeters in thickness. They apparently cling to the branches of the trees or lie in the grass, and fasten themselves on the individuals as they pass. The ankles have been their most common place of attack; the parasite apparently working in at the shoe-laces. In several cases they have entered the eye and fastened themselves beneath the lid, causing considerable pain and anxiety.

TREMATODES.

Paragonimus westermanii.—Opportunity is here taken to call attention to the fact that this parasite, which has been found in China and Japan and more recently in America, has lately been intimated by American writers to also occur in the Philippines. Although we have sought for it in this laboratory, we have not observed it here, and, so far as I know, the parasite has not been found in these islands. A word on its description may, however, not be out of place. The following account is mainly from that given by Stiles and Hassall in their recent article on this subject:

"The parasite has been found in the tiger, dog, hog, cat, and man, and seems to be identical in these animals. Its life history is still obscure. The fluke measures 16 millimeters long, 4 to 8 millimeters broad, and 2 to 5 millimeters thick. It is found encysted in the lungs. The eggs do not apparently develop until they leave their host by means of the sputum. Among the symptoms produced by this parasite, cough and spitting of blood are common. The sputum may resemble that of pneumonia between the attacks of hæmoptysis. Probably the disease is sometimes confounded with tuberculosis. The correct diagnosis may be made, however, by finding the ova in the sputum. The eggs are oval, with even borders, and possess a double outline. They measure from 80 to 100μ in length and from 40 to 60μ in breadth.

"Though the parasite is usually found in the lungs, it may at times locate itself in the brain, when attacks of epilepsy of the Jacksonian type may result. In other instances the liver and other organs may be invaded."

BOARD FOR THE INVESTIGATION OF TROPICAL DISEASES IN THE PHILIPPINES.—CIRCULAR No. 3.

BUBONIC PLAGUE.

Plague is an acute, infectious disease, running a rapid, severe course, and usually terminating fatally. It generally is characterized by buboes, high fever, severe general symptoms, and is frequently accompanied by subcutaneous hemorrhages, pustules, and carbuncles.

History.—From earliest times, writers have described epidemics of plague. Their descriptions are, however, too vague to permit of a diagnostication of the disease now known as bubonic plague, since the word "plague" was used to designate any highly fatal epidemic.

Egypt seems to have been the starting point for many of these ancient epidemics, which are first accurately described by Rufus of Ephesus, in the first century A. D. From his writings it is ascertained that the first carefully described epidemic occurred about the end of the third and the beginning of the second century B. C. This epidemic extended throughout Libya, Egypt, and Syria. From this time until the Justinian age numerous indefinite descriptions of bubonic plague have been given.

About 542 A. D. a second accurately described epidemic started in lower Egypt, especially in Pelusium, gradually extending thence along the north coast of Egypt to Palestine, Syria, and finally to Europe. The disease was present throughout Europe during the following half century. From this period to the fourteenth century A. D., Europe was visited by numerous epidemics, but again the descriptions are too vague for identification with plague.

A second severe epidemic raged throughout Europe during the fourteenth century, with an estimated death-roll of 25,000,000 of people. The disease was, moreover, continually here during the following three centuries, its severity gradually diminishing and the epidemics becoming more widely separated. The last occurred in Constantinople in 1841, but as late as 1878 a small endemic is recorded in the Russian-governed province of Astrakhan. Lower Egypt was the epidemic home for bubonic plague in Africa, as was Turkey in Europe, and Syria in Asia.

Epidemic centers of plague have extented into western Asia, whence it has spread to practically all of the Oriental ports, Oporto, and South America.

The history of plague shows that as civilization improved social and hygienic conditions, plague sought its more congenial surroundings amid the filth of the ignorant.

Etiology.—Plague is produced by the bacillus *Pestis bubonica*, first discovered by Kitasato. This bacillus is a short, round-end, encapsulated organism. As seen in smears from the blood and glands, it appears singly, in pairs end to end, and in chains of three or four. It varies in length from 1 to 1.8 μ, and in width from 0.4 to 0.7 μ. The size and contour of the bacilli vary greatly, these being determined to some extent by the culture media upon which they grow. Organisms found in the blood are frequently much larger and plumper than those found in the glands, and may often appear as very large cocci. The capsule varies greatly in size, but is usually about twice as wide as the bacillus. The organism is rarely seen in a cell. It stains by all the aniline dyes, and quickly decolorizes by Gram's method of staining. When lightly stained with Loeffler's alkaline methylene-blue, the organism frequently takes a bipolar stain, appearing very much like a diplococcus. If a smear is first stained by Gram's method, and afterwards lightly stained with methylene blue or carbol-fuchsin, a beautiful bipolar stain may be made.

The organism grows well in all the ordinary media. Twenty-four-hour-old colonies are small, round, even-edged, and almost transparent, with the center slightly milky. Under the microscope the colony is granular, slightly yellowish and darker in the center than about the edges. The edge is wavy, or more or less indented. At forty-eight hours the colony is somewhat larger, more opaque, and of a milky color.

On neutral plain agar-agar, at the end of twenty-four hours, a faint, translucent, slightly milky colored growth is observed. The growing edges are smooth and thicker than the central portion of the streak. The water of condensation is slightly turbid, with a slight whitish sediment at the bottom. At the end of forty-eight hours the streak is considerably larger than at twenty-four, slightly more opaque, and the edges are somewhat scalloped. No further important changes are noted in older cultures. When a portion of the culture is removed by a platinum wire a glutinous consistency is observed, the growth usually pulling out into long threads.

On blood serum a similar growth is seen, but slightly more opaque. No change in the media is noted.

On glycerine agar the growth is not so abundant as on plain agar.

On acid potato the growth is sparse, slightly moist, and of a very faint yellow color. No change on the potato is noted.

In bouillon the most typical growth is seen. The organism grows just under the surface of the bouillon, and on the sides of the tube. From the surface of the bouillon the growth projects downward in light, flocculent masses, which, on the slightest shaking, settle to the bottom. The bouillon remains clear.

No change is produced in litmus milk.

In litmus glucose agar-agar a slight reddening appears, which gradually extends through the entire media.

In glucose agar-agar stabs the growth continues along the entire stab, having a

whitish opaque appearance, and extending but slightly into the media. No gas is produced.

In peptone solution no indol is formed.

The organism from cultures does not, as a rule, take the bipolar stain, and the capsule, if present at all, is very much diminished in size. The organisms from the several media take all of the aniline stains, and rapidly decolorize by Gram's method of staining. On hanging drop, the organism has an active Brownian motion, but is not motile.

The diagnosis of plague bacillus in culture media is determined as follows: It decolorizes by Gram's method; produces no gas in glucose agar-agar; produces no change in milk; is non-motile; produces no indol; has the characters of growth as described for bouillon; is pathogenic for white mice, house rats, guinea-pigs, rabbits, monkeys, and all domestic animals.

The plague organism is long lived. From sterile paper, inoculated with a pure culture and kept in a dark place, the organism has been recovered after forty-five days. Sunlight destroys it within three hours. The bacillus is easily killed by the ordinary disinfectants, and is very susceptible to heat.

About a point of inoculation a local inflammatory swelling appears, with considerable œdema, induration, and hemorrhage. The nearest lymphatic glands are enormously swollen, hyperæmic, or hemorrhagic and œdematous. All of the lymphatic glands of the body are enlarged and hyperæmic. The spleen is enlarged, hard, and of a bright-red color, the anatomical structures being easily seen. Numerous hemorrhages may appear throughout the body. A more or less marked septicæmia is noted. The animals die, as a rule, in from thirty hours to four or five days, usually from fifty to seventy hours. The duration of the disease does not seem to depend on the dose of the organism.

General pathological conditions.—The body is usually not emaciated, and the subcutaneous fat is normal in color. Rigor mortis is usually early and well developed. Ordinarily the onset of putrification is delayed, except in secondary infections. General emphysema of the skin has been noted. The venous system is usually congested, and all of the organs are more or less hyperæmic or hemorrhagic. Parenchymatous and fatty degenerations are general. After the disease has become systemic, the bacilli are found throughout the body.

Skin.—The skin is usually dry and hot. Occasional outbreaks of perspiration may be noted; this is especially true in the pneumonic type. Some observers speak of an odor peculiar to plague. General œdema of the skin is not common, but may appear in cases complicated with nephritis. The appearance of hemorrhages in and under the skin varies greatly in different epidemics, and even in the same epidemic. In epidemics occurring during the fourteenth century, cutaneous and subcutaneous hemorrhages were common, giving rise to the name "Black Death." Hemorrhages may be divided into two classes, namely, the punctate hemorrhages into the deep layer of the skin, and the diffuse and often extensive hemorrrhages into the subcutaneous tissues. The small punctate hemorrhages vary in size from a pin-point to one-half of a centimeter in diameter. They usually appear a few hours before death over the face and trunk, especially about the shoulders and on the extremities. Their outline is sharp, and no change in the skin is noted. They vary in color from bright red to almost black. The diffuse subcutaneous hemorrhages appear toward the end of the disease over the face, trunk, and upper extremities. They vary in size from one-half centimeter in diameter to an area of 3 or 4 by 6 or 8 centimeters, and resemble a bruise. The hemorrhagic tissue teems with bacilli. The skin about old scratches, insect bites, etc., is usually hyperæmic.

Writers of all ages have mentioned the occurrence of exanthematous eruptions. Under this title many lesions were included. During recent epidemics numerous observers have described such exanthematous eruptions. Roseolar spots have also been noted. In several cases occurring in Manila wheals have been observed. Herpes is most unusual in plague and has never been observed in plague-pneumonia.

Lymphangitis rarely occurs in plague. When found, it is usually associated with a primary carbuncle or bubo. Occasionally it occurs without apparent connection with either. When present, the surrounding tissues are hard, indurated, the skin is reddened, and there is more or less pain. In the event of a favorable termination the lymphangitis gradually subsides.

The pest carbuncle begins with a bluish-black colored spot, similar to a subcutaneous hemorrhage. Within a few hours or a day one or more small vesicles appear, which latter form one vesicle filled with a slightly bloody fluid. The fluid in the vesicle may contain a pure or mixed culture of the plague bacillus. Within a short time the vesicle ruptures, leaving a reddened, granulated surface, which is soon covered with a reddish-brown dry scab. The edges are more or less indurated, sharply defined, elevated above the center of the ulcer, and surrounded by a varying, ill-

defined hyperæmic area of skin. Œdema accompanying the carbuncle may be very extensive. Associated with the carbuncle may be more or less lymphangitis. The size of the carbuncle varies from one-half to 5 or 6 centimeters in diameter. The superficial ulcer may spread rapidly after the vesicle is ruptured. This class of carbuncles is usually called primary. Some authors consider the primary carbuncle as a portal of entry. This is exceptional, as the portal of entry does not usually undergo an inflammatory process. Within two days after the development of the carbuncle the glands begin to enlarge and the fever develops. Carbuncles associated with the buboes occur later during the course of the disease. They are probably metastatic, and correspond to the second-order buboes. Carbuncles have no relationship to the severity of the attack.

During the course of the disease superficial vesicles may develop. These vesicles are formed by the accumulation of a bloody fluid under the epidermis, the base showing no inflammation, and the fluid usually containing the plague bacilli.

Muscles.—The muscles are usually of a dark color and dry. About the bubo more or less hemorrhage may be noted. The œdema accompanying the primary bubo of the first order rarely affects the muscles.

Bones.—The periosteum is injected, especially about the bubo. The bone marrow is normal, or slightly hyperæmic.

Lymphatic glands.—The lymphatic glands seem to be the elective seat of development for the plague bacilli. From the symptoms and the pathological manifestations of the disease it is learned that the glands always play an important, if not the most important, rôle. This is due to the general lodgment of plague bacilli in them.

The pathological condition of, and the relationship between, the lymphatic glands will first be considered, as a knowledge of the process at work in this system is essential to the proper understanding of the disease.

For convenience of description the nomenclature of Albrecht and Cohn will be used: The gland showing the most pathological changes, usually the first gland infected, is called a primary bubo of the first order; glands belonging to the same chain or group of glands as the primary bubo of the first order, and infected by the passage of bacilli through the lymphatic vessels, are called primary buboes of the second order; glands in distant portions of the body, infected through the blood supply, are called secondary buboes.

PRIMARY BUBOES OF THE FIRST ORDER.

Lesions of primary buboes of the first order may be divided into (1) those involving tissues around the bubo, and (2) those affecting the bubo proper. The degree of pathological change associated with primary buboes of the first order naturally varies with the severity and duration of the disease. The distinction between a primary bubo of the first order and one of the second is more relative than absolute. The difference found may be explained, to a great extent, by the difference in time of the infection of the respective buboes. There are, however, two important distinctions, which are easily made out, namely, œdema, and periglandular induration, which are characteristic for a primary bubo of the first order.

The skin covering a primary bubo of the first order is usually slightly reddened, and may present, in the immediate neighborhood, either pustules or carbuncles. In the early stages of the disease, the skin is freely movable over the bubo, but as the bubo enlarges and the periglandular infiltration increases, this mobility is lost. Varying degrees of œdema, depending on the amount of œdema accompanying the bubo, are noted in the skin. The œdema associated with a primary bubo of the first order is absolutely typical. The amount is very varied, ranging from a slight serous exudation into the tissues between the muscles, to an extensive exudation, involving all the surrounding tissues, and even extending to distant portions of the body. The œdema accompanying the femora bubo may be general from the knee to the thorax, and of the retroperitoneal tissue of the affected side, as far as the diaphragm. It is not uncommon for it to extend beyond the median line. When œdema is extensive, the natural grooves and contour of the affected part are, of course, destroyed. Cut sections through the œdematous tissues show a slight straw-colored, gelatinous consistency of the structures, from which a thin, light, straw-colored fluid slowly escapes. The blood vessels are enormously distended and punctate hemorrhages are frequently noted. The lymphatic vessels near the glands are also distended. Microscopical examination of the escaping fluid shows varying numbers of leucocytes, red blood cells and bacilli. This œdematous region is usually the last location suffering from secondary infection, and after death frequently pure cultures of the plague organism may be obtained here, when in all other portions of the body mixed cultures are found.

The tissues immediately surrounding these buboes are infiltrated with small, round

cells and some leucocytes, and present varying degrees of hemorrhage. The infiltration appears generally from 24 to 48 hours after the bubo begins to develop, and naturally limits the mobility of the gland. When the primary bubo is one of a group of glands, the infiltration obliterates the outlines of the individual glands, making one solid, immovable mass. The accompanying hemorrhages vary greatly in degree, ranging from a condition of extreme congestion to massive hemorrhages.

The primary bubo may vary greatly in size, ranging from a normal-sized hyperæmic gland to a bubo as large as a hen's egg. In rapidly fatal cases, death occurs before the glands have time to enlarge. In these cases septicæmia develops early; the glands may be slightly enlarged, hyperæmic, or more or less hemorrhagic, and œdematous, the surrounding tissues being œdematous or hemorrhagic. The œdema and periglandular infiltration of the surrounding tissues may be absent. When a bubo is well developed the gland is usually hard, and the cut section shows the capsule stretched, more or less hemorrhagic, and infiltrated. The cut surface of the glands bulges, is œdematous, more or less hyperæmic, and hemorrhagic. Portions of the glands not hemorrhagic or intensely hyperæmic are usually of a grayish color, with a faint yellowish tinge. Hemorrhages may be located in the cortex or extend throughout the entire gland. Oftentimes they follow the lymph sinuses. The center of the gland is usually soft, but pus is rarely found, except late in the disease. Microscopically a general coagulative necrosis, leucocytes, red blood cells, and masses of bacteria are seen in addition to the normal elements of the glands. Considerable fatty degeneration is usually present, especially near the center of the gland. Proliferation of the endothelial cells lining the lymph sinuses is seen in the earlier stages of the processes. With the hæmatoxylin and eosin stains the bacteria appear as faint blue masses.

PRIMARY BUBOES OF THE SECOND ORDER.

As stated above, these buboes belong to the same chain or group of glands as the primary bubo of the first order, and receive their infection from the first-order buboes through the lymphatic vessels. As a rule, the second-order buboes are not as large as the first, and are never surrounded by the œdema and periglandular infiltration, except when immediately associated with first-order buboes. The glands are usually freely movable, hard, and surrounded by more or less hemorrhagic tissue. The capsule is distended, and on cut section the gland substance bulges, is œdematous, hyperæmic, more or less hemorrhagic and soft in the center. The substance of the gland when not entirely hemorrhagic or hyperæmic is of a grayish color. Rarely is pus seen. Histologically, the first pathological changes are noted in the lymph sinuses, where may be seen a proliferation of the endothelial cells lining the sinuses, lymphocytes, leucocytes, red blood cells, and bacteria. More or less coagulative necrosis is seen along the course of the sinuses. The process rapidly extends throughout the glands, producing a picture similar, but less in extent, to the primary bubo of the first order.

SECONDARY BUBOES.

As before stated, the secondary buboes are those infected through the blood supply, and may include all of the remaining glands of the body. They are small, freely movable, œdematous, hyperæmic, and occasionally hemorrhagic. Histologically the glands show œdema, hyperæmia, and a necrosis of the elements in the center of the lymph follicles.

FREQUENCY AND LOCATION OF BUBOES.

In the greater proportion of cases of bubonic plague buboes are found. Russel records their presence 2,641 times in 2,700 cases, or 97.8 per cent; Wilm, in Hongkong, found 73 per cent. The percentage naturally varies in different epidemics.

All observers have found the femoral and inguinal buboes most common, the axillary next in frequency, and the cervical least often. Russel gives the following percentages:

Inguinal buboes, including femoral	per cent..	69.70
Axillary buboes	do....	21.54
Cervical buboes	do....	8.76

The following percentages in the sexes are given:

Inguinal and femoral buboes:		
Male	per cent..	45.35
Female	do....	34.81
Children	do....	19.84

Axillary buboes:		
Male	per cent	36.20
Female	do	31.63
Children	do	32.17
Cervical buboes:		
Male	do	25.10
Female	do	24.67
Children	do	50.23

These percentages closely agree with those given by other observers.

SPECIAL BUBOES.

A femoral bubo, when well developed, stands out prominently, and the œdema of the surrounding tissues is easily visible. The gland is hard, but the surrounding œdema may give a semi-fluctuating sensation. The inguinal glands may or may not be infected, as a group; frequently only one gland is enlarged. One or more, or all, of the iliacs, lumbar and pelvic glands of the same side may be affected. The œdema accompanying the femoral bubo may extend through the retroperitoneal tissue of the same side. The secondary buboes may be individually surrounded by hemorrhagic tissues, or the entire retroperitoneal tissue may be one mass of hemorrhagic tissue. The same process may extend into the pelvis. The involvement of the lumbar glands may cause a back flow of lymph in the side opposite the primary bubo of the first order, causing second order buboes. With a femoral primary bubo of the first order we may have primary buboes of the second order, involving the inguinal and iliacs of both sides, or the lumbar and femoral of the opposite side. Other glands involved would be secondary buboes.

An inguinal primary bubo of the first order gives more or less the same picture. In this case the femoral of the same side, the iliacs of both sides, the inguinal and femoral of the opposite side, and the lumbars, would be second order buboes. The remaining glands enlarged would be secondary buboes.

The axillary primary bubo of the first order presents the same œdema, etc., as above described. The remaining glands of the axilla and the chain extending along the vessels into the thorax, are the second order buboes, and may present the varying degrees of hemorrhage. The back flow of lymph may carry the infection to the glands of the neck and to the opposite side of the body.

The cervical primary bubo of the first order has the same characteristics. The cervical glands along the vessels are the second order buboes, while the back flow of lymph may carry the infection to the axilla of the same side, and to the opposite side of the neck. All involved glands not mentioned are secondary buboes.

In a small percentage of cases primary buboes of the first order are noted in widely separated regions, such as the axilla and groin of opposite sides, or cervical region and groin, or axilla and groin of same side. In these a double infection has probably taken place.

DEVELOPMENT OF BUBOES.

Buboes of the first order usually appear from the second to the fourth day of the disease; in some cases, however, the glands begin to enlarge with onset; while in others indefinite pains may be experienced at the site of the future bubo, before the development of the usual first symptoms. The development of the bubo is usually rapid, reaching its height from the sixth to the tenth day. In the greater proportions of cases death occurs before suppuration. Suppuration comes on during the second week of the disease, and is usually caused by organisms other than the plague bacillus. In a small percentage of the favorable cases suppuration does not take place. In these cases resolution occurs. Pain is usually most intense, causing the patient to assume any position which serves best to reduce pressure on the bubo of the surrounding parts and clothing. Often the pain is too severe to allow of palpation. When the active processes reach their limit pain usually subsides, to reappear when suppuration begins. When opened after suppuration, the bubo is frequently very slow in healing and, in some cases, gangrene may develop. These sequelæ are due to the general lowered vitality of the patient.

The second-order buboes appear shortly after the first order; in some cases the two classes seem to develop at the same time. When the first-order bubo is one of a group of glands it is often difficult to determine which is the first and which the second-order bubo. In the early stages of the disease the individual glands can be made out, but later they form one mass of immovable tissue. The pain accompanying the second-order bubo is, as a rule, not so severe as that accompanying the first order. The fate of the second-order bubo is similar to that of the first order. In

favorable cases second-order buboes, located within the abdomen, may suppurate, giving rise to serious complications.

Secondary buboes, as a rule, do not develop until the disease becomes general, or until septicæmia occurs. The toxins circulating in the blood may cause some general glandular enlargement. More or less pain is associated with the secondary buboes, but never equal to that of the first or second order.

Respiratory tract.—The nasal mucous membrane shows nothing, except occasional hemorrhages. Varying degrees of congestion and œdema are seen in the larynx. The mucous membrane of the trachea may be more or less injected and sometimes shows true inflammation. The lungs are more or less œdematous and congested, while varying degrees of bronchitis or broncho-pneumonia may be present. The pleura often shows punctate hemorrhages, both in the parietal and visceral layers; pleural hydrops may occur, especially late in the course of the disease. The glands at the base of the lungs are usually enlarged, and more or less hyperæmic. The mediastinal glands are enlarged, more or less hyperæmic and hemorrhagic.

Circulatory apparatus.—During life, the heart is one of the first organs to show the effects of the toxins circulating in the blood. From the beginning of the attack it is more or less dilated, its action usually weak, and frequently a systolic murmur is heard.

The pulse ordinarily runs from 90 to 100 beats per minute. Frequently, however, the rate increases to 180, or even 200 beats. In the beginning of the attack, the pulse is usually full, fairly strong, resembling the ordinary fever pulse. Within a short time, however, it becomes weakened, oftentimes dicrotic, small, and easily compressed.

The vessels of the pericardial sac are usually congested, occasionally showing a few hemorrhages. The sac contains more or less light-colored fluid. The heart is usually distended, and the superficial vessels engorged. Frequently numerous subpericardial extensive hemorrhages are noticed, especially over the left auricle and ventricle. The muscles are flabby, soft, more or less cloudy, and often show fatty degeneration. The valves and endocardium are usually unaffected, except for an occasional subendocardial hemorrhage. Histologically, the heart muscles show more or less parenchymatous change, with varying degrees of fatty degeneration. The vessels are congested, frequently containing a large number of leucocytes. Some red blood cells may be scattered throughout the tissues.

The arteries are usually not affected. In the neighborhood of buboes, hemorrhages may be noted into their outer coats. The veins about the buboes are usually studded with hemorrhages, which involve the entire wall. The induration about the bubo may include the veins. In these locations a favorable opportunity is offered the bacilli to enter the general circulation.

Alimentary canal.—The mucous membrane of the mouth is usually dry, more or less congested, hemorrhagic, and the lymphoid structures may be slightly swollen. The tongue is usually swollen, œdematous, and heavily coated white. As the disease progresses, the coat may become of a reddish-brown color, especially along the middle. The papillæ are usually prominent and congested. The salivary glands are rarely affected, except in cases of cervical primary buboes. The tonsils may be enlarged, hyperæmic, and even necrotic. The pharynx is usually congested. The œsophagus is not affected.

The mucous membrane of the stomach is usually covered with a dirty, brown, mucoid material, which contains more or less blood. Frequently it is studded with punctate hemorrhages, which may sometimes involve the entire wall. The lymphatic structures may be swollen. The mucous membrane of the intestines is usually more or less hyperæmic, and frequently presents, especially in the duodenum, numerous punctate hemorrhages. The lymphatic structures are usually more or less swollen and hyperæmic. The entire gut may be more or less bile stained. The mesenteric glands are usually enlarged, hyperæmic, and may be hemorrhagic. About the cœcum, the group of glands is occasionally palpable.

The saliva in ordinary cases presents nothing of interest. It contains the plague bacilli when the disease has become general. In pneumonic cases the saliva may become increased and contain more or less blood and bacilli.

Diarrhœa or constipation may occur. The bacilli may be present in the dejecta. More or less pain throughout the abdomen may be present, due, doubtless, to the enlarged mesentery glands. Frequently when the pain is located about the cœcum, and when the tumor mass above referred to is palpable, especially in the absence of the other symptoms of plague, it may be difficult to differentiate it from acute appendicitis. Pain in the epigastrium is common, and is often associated with nausea and vomiting.

Peritoneum.—The peritoneum is usually dry and the vessels congested. In some

cases a varying amount of straw-colored fluid is present. Occasionally, patches of peritonitis are seen over an iliac bubo.

Spleen.—The size of the spleen in well-marked plague cases varies from normal to three or four times original size, and may or may not be palpable during life. A typical plague spleen is firm, capsule tense, pulp substances increased, of a bright brick-red color, with more or less hemorrhages about the malpighian bodies or into the pulp substance, and œdematous. The trabeculæ are usually prominent. The diffluent spleen is not seen in plague except in mixed infections. Microscopically, the tissues are widely separated, with the small cells and the polymorphonuclear leucocytes increased, and desquamation of the endothelial cells lining the spaces. Varying degrees of hemorrhages may be noted throughout the tissues, especially about the malpighian bodies. The fixed elements usually show a cloudy protoplasm, with more or less fatty degeneration, and a diminished amount of nuclear material.

Liver.—The liver is usually somewhat increased in volume and congested. The surface may present many or few hemorrhagic areas about the longitudinal ligament and areas of fatty degeneration. Cut section shows degeneration, varying degrees of cloudiness, and a more or less bile-stained condition of the organ. Microscopically, parenchymatous and fatty degeneration are apparent. The nuclei stain faintly or not at all. The vessels are more or less distended.

Urinary system.—The kidneys often present marked hemorrhages into the capsule throughout the organ and in the pelvis. Parenchymatous and fatty degeneration and varying degrees of congestion occur. The ureters are not affected, nor is the bladder, except occasionally punctate hemorrhages may be noted in its mucous membrane. Cystitis has been observed.

The urine presents the ordinary changes seen in acute infectious diseases. Occasionally, from the third to the fourth day, a large amount of albumen, hyaline casts, and red blood cells are seen. Accompanying these changes in the urine may be more or less œdema of the subcutaneous tissues.

Generative organs.—Ordinarily no lesions are noted in the male generative organs. The German Plague Commission recorded one case of primary carbuncle on the penis. Œdema of the scrotum may be associated with femoral and inguinal primary buboes of the first order. The female organs of generation are rarely affected, though some œdema of the labia may occur. Hemorrhage from the uterus is not uncommon. In pregnant patients, abortion is usual; the child may or may not be dead.

Nervous system.—The membranes of the brain and cord are more or less injected, hemorrhagic, and œdematous. A few cases of plague meningitides have been observed. The brain and cord may be congested and œdematus. The ventricles usually contain an increased amount of fluid, and the choroid plexuses are hyperæmic. Throughout the body more or less hemorrhage may be noted in the sheaths of the nerves.

The derangements of the nervous system depend more upon toxic influence than upon direct pathological change. Usually during the prodromal stage of the disease no derangements are seen. When observed, they are similar to those of other infectious diseases: Weakness, indefinite feelings of sickness, dizziness, loss of appetite, headache, general pains throughout the body, etc. During the early stages, headaches and dizziness are common. Headache is usually severe and may be of the occipital or frontal type, or pain may extend throughout the whole head. Headache may continue through the entire course of the disease, presenting one of the most difficult symptoms for treatment, or it may be temporary or periodical. It usually disappears when the convalescent stage begins. Dizziness may be well marked, and may vary in a manner similar to the headache. When present it may cause the patient to have a drunken gait.

The condition of the general sensorium varies greatly in different cases. General weakness is usually noticed at the onset of the disease, and all degrees of the typhoid state, to complete coma, may be observed. These conditions may develop at any time during the course of the disease, and may be as well marked at the onset as later. General prostration is usually well marked. Frequently the patient is so weak as to be scarcely able to answer questions or to move about in bed. Often when in this condition the patient passes into a dreamy state, which may be only temporary, or which may gradually increase until complete coma results. Coma may develop at any stage of the disease, and be of a transitory nature, but more usually it continues until death. Delirium may develop at any time, and apparently does not depend upon the degree of the fever or of the severity of the attack. Practically all types of delirium may be noted during an epidemic, from the simplest illusions to the most violent motor disturbances. Subsultus tendinum, spasm, convulsions, stiffening of the neck, etc., may accompany the delirium. Hallucinations and mania may be present.

Paralysis of different sets of muscles, of different members, or of the entire body may occur. Frequently, varying degrees of aphasia are noted. This symptom may be due to central disturbances, or to local interference of a cervical bubo, or the œdema with the vocal apparatus.

Blood.—A drop of blood from puncture of the ear seems more watery and of a lighter color than normal. If drawn when the circulation is beginning to fail, it may be more or less venous in appearance. No change is noted in the red blood cells. Leucocytosis of the polymorphonuclear type is usually present from the beginning of the disease, varying from eight to forty-five thousand, or even higher, according to some observers. The blood platelets are usually increased in number.

Early in plague the blood is practically free from organisms. Gradually the organisms gain access to and rapidly multiply in it as the disease progresses. The bacilli enter blood either through the lymphatic vessels or by direct growth through the walls of the veins in the neighborhood of the bubo or buboes. During the later stages of plague and at autopsy the bacilli are practically always present. In cases upon which systematic blood examinations have been made, bacilli have been found from twenty-four to forty-eight hours before death. When organisms first appear in the blood, only a few may be seen on each slide. Often only one is found. The number rapidly increases, and frequently the blood is, just before death, practically a pure culture of the plague bacillus. The bacilli occur in the blood singly, in pairs, in chains of from four to five, and in clumps. Then capsules and characteristic staining are easily demonstrated. Appearance of the bacilli in the blood naturally gives an unfavorable prognosis.

From what has been said it is evident that examination of the blood is of very little diagnostic value during early stages of the disease, but later is of the utmost importance. During an epidemic the leucocytosis and increased number of blood platelets are important points in the diagnosis, even in the absence of bacilli, especially in differentiating from malaria and typhoid fever.

Fever.—Plague does not present a characteristic fever curve. The fever may be a simple continuous fever, or may remit, and even intermit. Morning depression and evening elevation are usual. The variation is usually from one to two degrees. Occasionally fever is noted for twenty-four to forty-eight hours after the onset of the disease, followed by normal temperature for twenty-four to forty-eight hours, and then sudden rise in temperature with severe symptoms and death. In one case of this kind observed the patient died within ten hours after the second onset of fever. Frequently the temperature is seen to drop below normal, to be followed within a few hours with a sudden rise and death. Temperature in plague cases usually varies between 102° and 104° Fahrenheit; occasionally 107° has been noted. Height of fever does not seem to bear any relation to the severity of the attack or to the accompanying delirium. Temperature rarely terminates by crisis, but usually gradually subsides to or below normal. A subnormal temperature during the convalescent stage is very common. Fever continues from six to ten days. In the event of the suppuration of the glands the fever shows the ordinary septic type. This type of fever may develop during the later stages of the disease, or some days after the true plague temperature has become normal. On opening the bubo the temperature usually rapidly falls. The degree of fever in plague is easily reduced by the cold bath, but is little affected by the ordinary antipyretic drugs.

Special senses.—During the height of a plague attack deafness may develop, especially in hemorrhagic cases, and in those with cervical primary buboes of the first order. Prognosis is usually favorable.

The conjunctivæ are more or less injected, and true conjunctivitis may superinvene. Keratitis, iritis, and panophthalmitis may occur.

Epidemiology—Portal of entry.—Experience has shown that plague is usually, if not always, an infectious disease, and that the organism must actually be introduced into the system before infection can take place. It is difficult, and usually impossible, to tell in a given case the portal of entry.

There is usually no local reaction about small scratches, etc., which are frequently seen on the extremities when a femoral, inguinal, or axillary bubo is present. Circumstantial evidence goes to show that the organisms gain access to the system through an abrasion of the skin. This abrasion may be either gross or microscopic. From the tissues about the abrasion the bacilli are taken up by the lymph and carried to the lymphatic glands.

The organisms may enter through the external mucous membrane, especially in children. Infection may also occur through the alimentary tract, especially when cold food is used. Inhalation of infected dust in factories or of dried sputum from pneumonic cases is another method of infection, the bacilli entering through the air passages or lungs. It is quite possible to contract the disease through sexual intercourse. In one of my cases this seemed to be the most probable avenue of infection.

Incubation period.—From time to time many experiments have been accidentally performed, which served in a way to determine the period of incubation. From these experiments, and from the large number of people kept in isolation camps it has been found that from two to ten days is the ordinary limit of the period of incubation, usually from three to six or seven days. During the epidemic in India in 1896 and 1897 no case came under observation with an incubation period longer than ten days. Some authors, however, claim that it may be as long as fifteen days.

Direct transmission.—Excretions from the patient, hemorrhages from the nose and lungs, menstrual flow, vomitus, fæces, secretions from pustules and carbuncles, and pus from the bubo contain the bacilli in varying numbers. Any or all may serve as the medium of direct infection. The bacilli have not been demonstrated in the perspiration. In air the plague organism has a very short life; when exposed to direct sunlight it is killed within three hours. An infection may occur while handling any of the above-mentioned excretions, or the bed clothing, etc., used by a patient. The sputum is of especial importance, as the patient may, with this secretion, infect a very large area; this is especially true in plague pneumonia. Naturally the cadaver is infected.

Indirect transmissions.—The plague organism, even when dry, has an indefinite life under certain conditions. Nonexposure to light does much to lengthen this period. Clothing, exposed fabrics, or dust or merchandise infected by means of dead rats or by handling in places where plague existed, or in whatever way infected, may transmit the disease. In this laboratory the plague organism was recovered from dry paper kept in a thermostat for forty-five days. How much longer it would live has not yet been determined. The organism of plague has not yet been found in the esteros or sewers of Manila, but there is no reason to doubt that it might live for considerable time in these locations. Kitasato has found the bacilli in fabrics brought from Bombay. Infected rooms, not properly disinfected, may serve to transmit the disease. Cadavers, even when buried, harbor the organism. Experiments are now being carried on to show how long the bacillus lives when so buried. Thus far, it has been recovered after two months. It has not yet been determined whether the infection is carried in water. Numerous cases are on record where infection has been carried by clothing, etc., which had been packed away for months.

Spreading of the disease is favored by unhygienic conditions, and crowding of dwellings. Individual habits also play an important part. In practically all epidemics, in whatever part of the world, the larger proportion of cases has occurred in sections of the towns having the smallest and poorest ventilated houses, with defective drainage and water supply. In these particular districts people usually crowd together and live under the filthiest conditions. In the better portion of a city infected with plague but few, if any, cases occur.

Spreading of the disease.—Plague infection may be carried from place to place in various ways. Among others, the removal of a person sick with the disease is an important means, as is also the arrival from an infected place of a person who has been exposed to contagion and for whom the incubation period has not elapsed. Under these circumstances the organisms are spread about in the fæces, urine, sputum, and to some extent in the bed clothing of the sick person; the well, of course, not carrying the infection except by clothing, etc., until attacked by plague. The nature of the disease and the precautions to be taken against it are unknown to the general public, therefore its further spread may be easily accounted for. It has been noted that ordinarily first cases imported into a new field attract little attention, as but few cases immediately follow the infection. Bacilli have been found in fabrics brought in bulk from infected ports. This is a most dangerous method of spreading the disease, as these fabrics enter a new field and are handled by the inhabitants, who are thus brought into direct contact with the organisms. The disease may in this way be spread over a large area before its true nature is discovered. The emigration of rats from district to district is also an important factor in the spreading of the plague. Infected rats from ships may also carry the disease from one country to another.

Extension of the epidemic.—When introduced into a new district, plague does not make rapid progress at first. Usually considerable time elapses between each case, and the disease may linger practically without manifestation for one, or, possibly, for two or more years. During this time, however, different areas are becoming infected. These later serve as starting points for a more or less extensive epidemic. Even with beginning epidemic prevalence, the disease spreads slowly, not going from house to house and from district to district, but jumping from one house to a distant one, in the same or neighboring blocks, or in an entirely different part of the city. This is undoubtedly accounted for by the visiting of people in the infected house, or by the using of commodities bought from an infected store. As time goes

on, the number of infected places naturally increases, and with this increase an increased number of cases of the disease may be looked for. In an infected city these infected areas may be considered to be the endemic location of the disease for that particular city.

The yearly duration of an epidemic of plague is usually but a few months; rarely does it last longer than six. The majority of the cases occur within two or three months. As a rule, an epidemic of plague has a rather sudden decrease toward the latter part of its course. A few mild cases are noted, however, from time to time for some months after the epidemic has subsided. When once introduced, plague continues from year to year, with an occasional intermission of a year, for an indefinite time. The disease is kept alive during the intervals between the epidemics by mild cases, infected fabrics, houses, etc.

Duration of the disease.—According to most observers, the larger proportion of deaths occurs within the first eight days, usually from the third to the fifth. In severe forms of pest, death may occur within twenty-fours after onset of the first symptoms. When death occurs late during the second week of the disease, secondary infections are usually present. The average duration of symptoms of plague proper is from six to eight days. Secondary infections may prolong the attack from four to six weeks. The convalescent period may be short or long drawn out, due to the severe prostration caused by the attack. Emaciation accompanying a short attack may not be noticeable, but is usually well marked in severe attacks of long standing. General extensive necrosis of all of the organs predisposes the convalescent to secondary infections: suppuration of buboes, parotitis, skin abscesses, suppuration of the middle ear, etc. During the convalescent period, recrudescence of the disease may occur from the first to the eighth week. The prognosis is unfavorable. The same individual may be subjected to two or more attacks of plague, occurring at shorter or longer intervals. Therefore attacks confer only a relative immunity.

Plague among animals.—Plague has been found in practically all the domestic animals. From earliest times writers have noted the susceptibility of rats and mice during plague epidemics. In I Samuel v and vi, plague is mentioned as existing among the Philistines, and the pollution of the fields by mice is noted. To counteract this pollution the Philistines made gold images of mice to appease the gods. Avicena, in 1000 A. D., says that when rats are affected with plague they come out of their holes and act as if drunken. Nicepheros Gregaros, in 1348 A. D., says that rats are affected by plague, and come out of the walls of the houses, etc. He also mentions that dogs and horses are affected. In recent years rats have undoubtedly played an important rôle in the propagation of plague. In numerous instances, before the existence of plague became generally known, large numbers of dead rats have been found in streets, alleyways, etc. Usually during a severe epidemic among the rats they emigrate, evidently to escape the sickness. In this way they carry the disease from district to district. Epidemics are not always noted among rats, even when many people are affected with plague. There is no doubt as to the nature of the disease in the rat, as numerous observers have made careful studies and autopsies and have invariably found evidences of true plague. The source of plague in this animal has not yet been definitely determined and, indeed, is a difficult question to settle. As the plague organism is probably long lived, rats may acquire the disease from some old fabric which was formerly infected with plague, pick up the organism in the ground, or receive the infection from a patient sick of plague. In these instances what might otherwise be a harmless organism may, on new soil, become virulent. From time immemorial, insects, fleas, mosquitoes, etc., have been believed to play an active part in spreading plague, and only recently has the opinion been advanced that fleas are the active agents in spreading the disease from rat to rat, and from rat to man.

Climatology.—The history of epidemics of plague shows that the disease may flourish in the tropic, temperate and frigid zones, at the sea level, and at high elevations, and during all seasons. When once introduced into a locality, plague seems to favor certain seasons of the year, and the yearly epidemics follow these seasons with great regularity. In the Tropics the ending of the cold season and the beginning of the hot, dry season is the favored time. It has been noted that when the temperature reaches its highest point plague begins to decrease. At the end of the dry season and the beginning of the rainy season the epidemic is practically ended. A few cases appear from time to time during the entire rainy season.

Age, sex, race, and occupation.—Age seems to have but little importance as to susceptibility to the disease. Children and old people are alike affected. The great majority of cases, however, range between 20 and 40 years. After 50 years the number of cases is proportionately small. The disease is about equally distributed between the two sexes. All races are alike prone to infection. The few cases occur-

ring among Europeans is due more to social conditions than to racial immunity. Laborers at all trades are affected, but it has been noted that those continually working in water and oil rarely contract the disease.

Plague may be associated with any of the ordinary diseases, and its severest type often accompanies diseases of a chronic nature.

Mortality.—Mortality in the several epidemics of plague varies greatly, ranging from 30 per cent to 93 per cent. In Manila, in 1900, the mortality was 73 per cent, including all cases.

Methods to be used when the presence of the plague is suspected.—An early diagnosis of first cases is essential. This may be made by a thorough microscopical and bacteriological examination, or, in the event of death, by autopsy. The agglutination test is of diagnostic value; it is usually positive after the ninth or tenth day.

Suspected cases should be isolated and closely observed. Those associated with the suspected cases should also be isolated in a detention camp for at least ten days. The effects and dwelling of the suspected case should be thoroughly disinfected. Unhygienic localities should be cleaned and disinfected. It would be cheaper to destroy these sections than to endure from year to year expensive methods of handling the disease and the check to commerce usually experienced.

The plague hospital or detention camp should be in an isolated spot and so constructed that all of the infectious material may be easily sterilized.

Methods pursued in combating an epidemic.—The ordinary methods pursued are: Searching for and removal of sick; isolation of those known to have been exposed to the disease; cleaning and disinfection of houses in which sick have been found, including its surroundings, furniture, clothing, etc., used by the occupants.

Early removal of sick reduces to a minimum the amount of infectious material which they may scatter in their immediate vicinity. Information regarding sick is obtained either by house-to-house inspection or by dividing the city into districts in which the inhabitants are required to report all cases of sickness to the nearest health officer, whose duty it is to diagnose and dispose of each case. Positive and suspected cases of plague should be transferred to the hospital. Those exposed to contagion should be isolated, preferably near the plague hospital. Ten days is the usual period of isolation.

The house and surroundings should be thoroughly cleaned and disinfected. For this purpose, carbolic acid, bichloride of mercury, tricesol, or any other cheap, reliable disinfectant may be used. The furniture should be washed with disinfectants, and the clothing, etc , especially that used by the sick, should be disinfected by steam or soaked in a 3 to 5 per cent solution of carbolic, or a 1 to 1,000 bichloride solution, for one hour.

The general hygiene of the infected locality should be improved. A systematic cleaning of houses, yards, streets, and sewers should be carried out. An attempt to exterminate the rats should be made. This may be done by poison, depriving them of their hiding places, etc.

The inhabitants of infected localities should be taught the nature of plague, and the individual precautions to be taken against it. This may be done through the newspapers, posters in each dialect and language, schools, churches, etc.

Individual prophylaxis.—Those coming in direct contact with the disease should disinfect the hands with carbolic acid or bichloride of mercury immediately after exposure. When cuts, scratches, etc., are on exposed parts, infectious material should not be handled. General cleanliness should be maintained. The clothing should be covered; the feet protected; recently cooked food, only, used, and infected localities, houses, stores, etc., as far as possible, avoided.

Quarantine regulations can not be too rigorously enforced.

No passengers nor animals should be allowed to leave the infected port except in the case of passengers after a period of detention of ten days; all baggage and cargo should be thoroughly disinfected. If during an ocean voyage of more than ten days' duration plague does not develop aboard ship, the passengers may be allowed to land; otherwise, a quarantine should be established, and the effects of the passengers, cargo, and ship should be disinfected.

General clinical observations.—Writers on plague have given many distinct forms to the disease, but the following completely cover the ground: Pestis minor, pestis bubonica, septicæmic plague, pneumonic plague. Of these, the bubonic type is most common, the septicæmic form second in frequency, and pestis minor predominant before and after an epidemic.

Pestis minor is often noted many months before and after the real epidemic of plague. It may appear in sporadic cases or in a light epidemical form. Usually, when isolated, one or more buboes develop, with more or less fever. The symptoms are, as a rule, light. The organisms may be found in the bubo and the blood, but,

as a rule, are not highly pathogenic. The bubo may go on to suppuration or resolution. Afterwards, severe epidemic cases are seen, in which a single gland or group of glands is enlarged, painful, associated with more or less debility, dizziness, headache, sleeplessness, some disturbance of digestion, and more or less fever. The nature of these cases is, in part, determined by the place of dwelling. They most frequently develop in houses in which plague was common during an epidemic.

The bubonic type.—Ordinarily, onset of the disease is sudden, without any prodromal symptoms whatever. Occasionally a train of prodromal symptoms may be noted for twenty-four to thirty-six hours before the onset of fever. These symptoms are usually a general bad feeling, weakness, light chills, pains in the legs, some headache, sleeplessness, and loss of appetite. There may be some vomiting and dull pain about the seat of the future bubo. Usually, as stated, the disease begins suddenly with a fever. The fever may rise suddenly, reaching its highest point during the first day of the disease, or it may gradually rise, taking from two to three days to reach the fastigium. The onset of the fever may be accompanied with an initial chill of varying intensity. In addition to the initial chills, chills of more or less severity may continue at irregular intervals throughout the course of the disease. These chills do not seem to bear any direct relationship to the course of the fever or to the severity of the attack. The bubo usually develops from the second to the fourth day of the disease. Patients are usually admitted to the hospital during the bubonic stage. The following general conditions have been noted: Perspiration apparently greatly diminished, or entirely absent; occasionally more or less profuse periodical perspirations; skin usually œdematous, especially on the extremities; frequently intense itching; some pain in skin from time to time; over the bubo more or less reddening; skin usually dry and hot.

In the early epidemics of plague, subcutaneous hemorrhages were evidently more frequent than in recent ones. Ordinarily, hemorrhages do not appear until late in the course of the disease, or just before death.

The facial expression is often most peculiar, and, when once seen, can never be forgotten. It seems to be a mixture of pain, fear, and anxiety. The eyes may or may not be deeply sunken, and dull in appearance. The pupils are usually slightly dilated; in some cases the eyes have a fixed, staring appearance. Convergent strabismus is frequent.

The tongue is usually heavily coated white, and later during the disease is of a brownish color along the center. The papillæ usually stand out prominently and the edges are bright red and œdematous. The entire tongue seems to be swollen. The pharynx is usually reddened and may be deeply congested. The tonsils do not show any constant symptoms. The veins of the neck are usually distended and pulsating.

The movements of the two sides of the thorax are equal. Palpation usually shows the vocal fremitus increased. The percussion note may be somewhat defective, and auscultation usually reveals a slightly roughened breathing sound, with more or less moist rales. Respiration is usually somewhat shallow, apparently labored, and increased in frequency, often reaching a rate as high as fifty or sixty per minute. This is undoubtedly due to the extreme congestion, œdema, and bronchitis or bronchopneumonia noted in the lungs. The heart is usually somewhat dilated, the area of pulsation increased and a soft systolic murmur audible. The pulse is weak, often dicrotic, small, and easily compressed. The rate is usually increased, ranging from 90 to 140, or even as high as 180, beats per minute.

The abdomen usually presents nothing of interest. Seldom is the spleen palpable and the liver is usually normal in size. When the mesenteric glands are markedly involved, considerable pain may be felt over the entire abdomen. Occasionally the involved iliac glands may cause considerable pain.

The urine presents the usual febrile characteristics, diminished quantity, with some blood and pus cells. Occasionally there may be a complete anuria. There may be either diarrhea or constipation.

As has been noted, the primary bubo of the first order may be preceded by indefinite pain in advance of the usual initial symptoms of the disease. Beginning with the initial symptoms, the glands may begin to enlarge and be very painful. Ordinarily, however, the glands do not begin to enlarge until from the second to the fourth day of the disease. The rapidity of the processes at work in the glands varies greatly. Within a few hours the gland may reach its largest size; ordinarily, however, the process requires from two to four days. During the stage of development of the bubo the pain is usually severe. In comatose cases, pressure on the bubo may elicit evidences of tenderness when other attempts fail to arouse the patient. When the bubo is fully developed, the pain usually diminishes in intensity or entirely disappears. In the event of suppuration more or less pain may be present. In

favorable cases suppuration usually occurs during the second week of the disease. The second-order bubo rapidly follows the primary bubo of the first order. The characteristics of the second-order bubo have already been described.

Affections of the nervous system above described may be present. The prostration is, perhaps, the most constant symptom accompanying plague, and is usually found in a degree not to be seen in other infectious diseases.

The facial expression, increased pulse, rapid respiration, extreme prostration, and the presence of buboes present a striking, characteristic picture which can not be confounded with that seen in any other disease. Naturally, the prominence of each symptom varies greatly.

Septicæmic plague.—This is the most virulent form of plague and usually begins without any premonitory symptoms, with high fever and general collapse. Symptoms noted in the early stages of the disease are practically the same above described, except of a severer type. The pulse is usually very rapid, extremely feeble, and may be intermittent. Delirium may be present, and coma may develop early in the disease. The spleen can frequently be felt, and all the glands of the body are somewhat enlarged, without any primary buboes of the first order. There may be severe pains in the stomach, with frequent vomiting of blood. Blood may also be found in the stools and the urine. Prostration is usually severe. Bacilli are found in the blood from the beginning. Death may occur in this form of the disease within twenty-four hours after the onset of the first symptoms.

Plague pneumonia.—From descriptions found in some of the older writings, it is evident that plague pneumonia has existed in all epidemics, possibly to a greater extent formerly than now. Childe first determined the true nature of the train of symptoms which had been previously observed.

The pneumonia naturally divides itself into primary and secondary forms. The primary pneumonia is the form of plague usually styled "plague without buboes." The secondary pneumonia may be caused by infection through the circulation or by inhalation of infected matter from the upper air passages. The onset of the disease is usually sudden and without any prodromal symptoms. It is commonly ushered in by a chill of greater or less severity. Frequently this chill is followed in a few hours by a second chill of varying intensity. Occasionally no chill is experienced. The general condition of a patient usually seen in the ordinary type of plague immediately follows the chill, and for a time it is impossible to determine whether the disease will assume a bubonic or pneumonic type.

The number of cases of primary pneumonia, which have been closely studied from the onset of the disease, has been limited, but from these it has been found that the pneumonic symptoms usually develop from the second to the fourth day. Commonly, more or less cough is present, associated, as a rule, with an increased amount of expectoration. Varying degrees of dyspnœa and cyanosis may accompany the cough. The rusty sputum of lobar pneumonia is not present. Associated with the cough is more or less hemoptysis, which gives a bright red expectoration. The sputum is often streaked with blood; on the other hand, it may be entirely free from blood. The plague bacilli are present in enormous numbers, frequently in pure culture. The absence of herpes in plague pneumonia is of a diagnostic importance. The pulse is usually very weak, and reaches, in these cases, 180 beats per minute, while the number of respirations may be as high as 75. More or less bronchitis is present, from the onset of the disease. The diagnosis of plague pneumonia may be difficult. This is due to the smallness of the areas of infected lung tissues. Within a very short space of time, however, these areas enlarge, when typical symptoms of pneumonia may be found. The spleen is always enormously enlarged in the pneumonic plague, and may be easily palpated. This is of a special importance in diagnosis. As the disease advances, septicæmia, carbuncles, and enlarged glands in various portions of the body may be found. The patient may infect the skin by means of scratching, giving rise to a primary bubo of the first order, with its usual train of symptoms. In plague pneumonia the glands at the base of the lungs would naturally be classed as primary buboes of the second order. Other enlarged glands would be secondary buboes, except in the event of a second infection, giving rise to a primary bubo of the first order. The infected lung may go on to necrosis and gangrene. The disease is usually fatal from the second to the fifth day; a few cases, however, have been known to recover.

To recapitulate: The chief points in the diagnosis of plague pneumonia are: Extreme prostration; high pulse; rapid respiration; characteristic sputum with plague bacilli; absence of herpes; enlarged spleen; physical changes in the thorax.

Secondary pneumonia in plague may be of the ordinary type, similar to that occurring in any infectious disease. In this class of pneumonia the sputum is not characteristic and never assumes the character of that seen in primary plague pneumonia.

The plague bacilli are always present. More or less blood is coughed up, which may or may not be intimately mixed with sputum. The pneumonia varies in degree from a light broncho to a lobar pneumonia. The usual physical signs are present, and need not be described. There may also be varying degrees of pleurisy. Secondary pneumonias usually occur at the height of the disease; that arising from emboli may occur at an earlier date. This complication is usually fatal.

Prognosis.—Prognosis naturally depends on the resistance of the individual, the location of the bubo, etc., the severity of the complications and especially on the virulence of the organism. During the course of the disease, but little can be said regarding the outcome, as any or all of the symptoms may change for the worse, without warning.

Generally speaking, the prognosis is unfavorable. The mortality, as has been noted, varies from 30 to 93 per cent.

Diagnosis.—During an epidemic the diagnosis usually offers no difficulty. The sudden onset, the rapid development of fever, and general extreme prostration are sufficient to establish the diagnosis. There is no disease in which prostration reaches such an extreme degree as in plague. When the above symptoms are associated with buboes, the nature of the disease is evident. In localities free from plague, and before and after an epidemic, the differential diagnosis may be difficult, or even impossible.

Light cases with buboes and slight general symptoms, with some fever, may be mistaken for what is called "climatic buboes." Climatic buboes usually occur in the groin, are painful and may go on to suppuration. Some fever is present. The attack is usually over within a week. The disease may be sporadic, or appear as a slight epidemic. The bubo and blood are bacteriologically negative. In plague cases, the glands are usually, and the blood may be, positive bacteriologically. The two diseases may be of equal severity.

In children, febrile adenitis must be considered. Febrile adenitis may be sporadic or epidemic. The disease occurs with some fever, which may reach 103° or 104°, and usually more or less cervical glandular swelling. Occasionally an axillary gland may be involved. The attack is usually light and lasts but a few days. The glands are negative bacteriologically. If the attack assumes a serious nature the disease may be at once differentiated from plague.

Light cases of plague may be confounded with venereal buboes. A thorough physical examination should make differentiation easy.

Severer attacks of plague, especially in the absence of buboes, must be differentiated from malaria, typhoid, and relapsing fevers. In these cases the general symptoms of the disease must be carefully considered. The sudden onset, conjunctivitis, reddened pharynx, rapid inspiration, etc., must be sought for. Blood examinations will usually give the surest diagnosis. In relapsing fever the blood examination is distinctive.

Dengue fever occurs with fever and glandular swellings. The pain about the joints and in the muscles associated with the exanthema and the favorable termination of the attack suffice to separate the two diseases.

Rubeola and mumps, with glandular swelling and the absence of the other symptoms, may be confounded with plague. Here the microscope is of service.

Diphtheria with minor throat symptoms may simulate plague. Here the bacteriological examinations are most valuable.

In the absence of external glandular enlargements, with extensive involvement of the mesenteric glands, especially those about the cœcum or of the higher iliac glands, appendicitis must be considered. The general appearance of the patient, the vomiting, fever, leucocytosis, and localized pain about the lower right side may be misleading. Examination of the blood may or may not determine the nature of the disease. Increase of blood platelets may, in the absence of the organism, aid in the diagnosis; within a few hours the development of the bubo may solve the problem.

An isolated case of plague pneumonia may pass unnoticed, especially when of the bronchitic or broncho-pneumonic type. The sudden onset, with extreme prostration, the character of the sputum, and the finding of the bacilli serve to make the diagnosis. If these symptoms are not noticed the development of a bubo will facilitate the diagnostication.

Lesions of the skin in pest rarely offer any difficulty, as other positive symptoms are usually present. Malignant pustules must be considered.

In locations liable to plague, too much care can not be exercised. Considering the manifold manifestations of plague, and the importance of diagnosing the first case, one's suspicions should always be active. In the event of death an autopsy should by all means be performed, when the nature of the disease can usually be determined.

Treatment.—The treatment of plague naturally divides itself into sustaining and improving the general condition of the patient, and into reducing, as far as possible, the unfavorable action of the toxins and bacteria in the system.

Under the first division is included the symptomatic treatment, which naturally varies from time to time, and comprises the usual routine, such as cold baths, heart stimulants, and palliative treatment of the pain, etc.

The treatment of the bubo has been, and is, a much-disputed question. Many advocate the early removal of the affected gland, while others oppose this method. From the study of the pathology of plague, it appears that removal is, in most instances, of no practical benefit. Usually the deep glands of the infected chain are involved before the operation could be done, and would naturally serve as an uninterrupted source of infection. It would be practically impossible to remove the entire chain of glands. Ordinarily it is best to allow the glands to remain, and to open them when suppuration begins.

The skin lesions should be treated in the ordinary antiseptic way. All wounds should be carefully watched, as they may serve as sources of infection.

Results of experiments seem to show that smaller animals can be made immune to the disease, and that the serum prepared from immune animals has protective and curative properties when inoculated into other animals. Attempts to prepare antipest serum have, until very recently, been more or less unsuccessful. The serum was not of sufficient strength to be of any practical therapeutic use. Yersin's serum, obtained from the Marine Hospital corps, has been found useless here. Recently a small quantity of serum was obtained from Tokyo. With this, two out of three patients have recovered. In one case the bubo was not opened; in the second, they were, while the third case was too far advanced to offer any hopes of recovery. At present, the serum is too weak to admit of general use, as the necessary quantity could not be produced. Inoculation with small quantities gives a temporary immunity.

Protective inoculation, as practiced, is said to be of value. Sterile cultures are most commonly used. Local reaction and some fever usually occur, and may last three to six days. The protective power does not develop for six to eight days, and when developed is only temporary. Protective inoculations are not practical for the following reasons: Enormous plant necessary to produce the material; working force needed to inoculate the inhabitants; opposition of the people to the inoculation; temporary benefit derived. While statistics are favorable to protective inoculation, study of the epidemiological features of the disease throws considerable doubt on its real value.

OBSERVATIONS UPON DISEASES IN THE TROPICS, BY MAJ. CHARLES F. MASON, SURGEON, TWENTY-SIXTH UNITED STATES INFANTRY, VOLUNTEERS, JARO, PROVINCE OF ILOILO, P. I., NOVEMBER 15, 1900.

These remarks are based upon careful observation during about a year of service each in Porto Rico and Panay, P. I.

In the first place, as to acclimatization; if that term is intended to convey the idea that the constitutions of white men gradually adjust themselves to tropical conditions and thereby become better able to withstand disease, then I do not believe that there is any such thing as acclimatization. Men do gradually learn how to take better care of themselves, and to that extent are less liable to disease, but in my opinion the great majority of white men in the Tropics suffer a gradual deterioration of health, and year by year become less and less fit for active service.

In the second place, I am struck with the relative infrequency here of certain diseases common in Porto Rico, while certain other diseases often met with here were of rare occurrence there. This difference is shown in the following table:

Disease.	In Porto Rico.	In Panay.
Filariasis	Common among natives	Rare or absent.
Ankylostomiasis	do	Do.
Chiggers	Common among soldiers	Do.
Syphilis	Common among natives and soldiers	Do.
Malarial fevers	Common among soldiers	Uncommon.
"X" fever	do	Rare or absent.
Pyæmia	Uncommon	Not rare among soldiers.
Beri-beri	Rare or absent	Common among natives.
"Y" fever	do	Common among soldiers.

While I have not seen a case of syphilis originating here, other venereal diseases are abundant; in Porto Rico syphilis was a scourge.

This island had the reputation of being malarious, but I did not see a clearly defined case until the return of two of our companies from field service in Negros, when a large percentage of those organizations were affected with typical malarial intermittent and remittent. Unfortunately, I had no microscope, but the disease yielded promptly to quinine. Since a microscope has been available the only malarial organisms I have found have been in patients who have suffered severely with malarial fever in Cuba.

The fever which I call "X," as denoting my ignorance of its nature, I have not seen here, while it was very common in Porto Rico. It was evidently of a specific nature; began suddenly with chilly sensations, high fever, nausea, frequent vomiting, constipation, headache. After five days to a week the temperature fell to normal, with slow pulse, jaundice, and albuminuria. The patients appeared very sick, but always recovered.

"Y" fever, also an unknown quantity, occurred here epidemically at the end of the dry season. Like "X" it was evidently specific, beginning abruptly with chilly sensations, headache, rheumatic pains, and high fever. There was usually a sudden fall to normal in five to seven days, the drop in temperature being attended with profuse sweating and marked weakness. There was no eruption, no secondary fever, no jaundice. The patients all recovered, but slowly, and convalescence was often accompanied by obstinate neuralgias. This is the disease that was often diagnosed "dengue," but it frequently occurred in patients only recently recovered from the latter disease, and must not be confounded with it. True dengue also prevails here.

The pyæmia referred to is a very interesting condition, but though I have seen a number of cases they were all in hospitals not under my charge, and I can only briefly refer to it. Its distinguishing feature is its origin without apparent cause. The patient begins to lose health and strength and to have chills, fever, and sweating; then some limb or joint is observed to be swollen, and upon examination pus is found. The abscesses are nearly always large, deep seated, and uncircumscribed; favorite sites are the groins, axillas, and buttocks. One after another they are opened and drained, until the patient usually dies from exhaustion and septicæmia. Most of the cases have given a history of antecedent gonorrhea, and in the absence of more obvious causes this possible source seems worth considering.

Dysentery and diarrhea are about equally common in both islands, but there is a type of diarrhea here which I did not see in Porto Rico. This form of disease closely resembles in symptoms the hill diarrhea of Manson, but prevails at all levels. It occurs epidemically at the commencement of the rainy season, and is characterized by profuse, pale, watery, frothy stools with much flatulence and colic, the movements commencing after midnight, almost or entirely ceasing by noon. It appears to be dependent upon suspension of the functions of the liver and consequent flatulent indigestion, the result of overeating and chilling of the abdominal contents by cold drinks, exposure to cold in the early hours of the morning, and excessive dampness.

Dysentery prevails throughout the year, but there is a marked increase in the number and severity of the cases at the commencement of the rainy season and a progressive increase in both respects until a maximum is reached toward the end of August. It is by far the most serious disease which attacks the white soldiers in the Tropics both as regards its mortality and its invaliding effects. Out of 32 deaths from disease in the Twenty-sixth United States Volunteer Infantry during its first year of service in the Philippine Islands, 16 were from dysentery and its complications, and 10 more from typhoid fever.

Boils, abcesses, and leg ulcers are very common, the latter especially during campaign, when it is impossible to keep the underclothing clean. Though not dangerous to life, these seemingly trifling ailments put a large number of men out of service temporarily and correspondingly swell the sick report.

Suppurative inflammation of the middle ear with perforation of the drumhead is of frequent occurrence. It is insidious in its commencement, often deafness and sudden discharge of pus being the first symptoms noticed. Upon examination an acute catarrhal pharyngitis is usually found.

Another interesting condition is the prevalence of buboes, both in the groin and axilla, without discoverable point of origin. Frequently a careful examination of the tributary lymph district fails to reveal any lesion whatever; and this though the bubo may proceed to suppuration.

Smallpox, which is widely prevalent during the dry season, disappears almost completely during the rains. Possibly this may be explained by the greater freedom of communication in the dry season, or more probably by the active agency of dust as a carrier of infection.

BERI-BERI.

The only case of beri-beri in the person of a United States soldier was reported from Carranglan, Nueva Ecija, Luzon, by Contract Surgeon J. M. Ward. The patient, a colored soldier of Company G, Twenth-fourth United States Infantry, was admitted into hospital June 16, 1900. For six months prior to admission he had been subject to occasional malarial attacks of no great severity or duration. On the day of his admission he had a severe chill, followed by the usual fever, but accompanied with unusual and excessive pain in the head, back, and lower limbs. Next morning the headache continued and he had much pain and stiffness, particularly in the right leg, in which the reflexes were abolished. The space limit for the sensation of two points varied from 4 to 6 inches at various points. Tickling the soles of the feet gave some response on the left side; none on the right. The loss of power in the right quadriceps extensor was so marked as to make locomotion practically impossible. The circumference of the right thigh measured 20 inches; bowels normal and urine free from sugar and albumen. Temperature 37.4° C. The history of this case is given in the following extracts from Dr. Ward's report:

June 20.—General condition unchanged. Loss of power in the extensor muscles so great that patient can hardly stand; locomotion entirely lost. He complains of great pain on slightest movement of lower extremities and numbness and tingling principally in right leg. Atrophy visible to the eye; thigh circumference 18 inches.

June 25.—Unchanged, except increasing loss of muscular power and decrease in pain and stiffness; thigh measurement 16¾ inches.

June 30.—Seems much improved; appetite returning; sleeps well; bowels regular. Measured to-day 16 inches around thigh.

July 15.—For last two weeks great improvement. No pain on movement; can stand without crutch. Thigh measurement 15¾ inches.

July 25.—Patient has steadily improved except for slight iodism one day. Walks to company kitchen for meals.

July 27.—Discharged to quarters. No sign of the morbid process remains except general weakness and some cardiac irritability.

On admission the usual antimalarial treatment was given, with a hypodermic injection of morphia. Afterwards the treatment was tonic with special diet; iodide of potassium, 10 grains, increased to 30 grains, three times a day, and strychnia sulphate by hypodermic injection in the quadriceps extensor twice daily; massage one hour every day,

Beri-beri has prevailed quite extensively among the Filipino prisoners of war. Special rations were provided for these cases and a marked improvement in their condition was recorded as a result. About 50 per cent of all sickness among prisoners is said to be due to this disease.

Report of an Epidemic of Beri-beri among Native Prisoners in the United States Military Prison, Lingayen, Pangasinan, P. I., by Contract Surgeon Frank L. R. Tetamore, January 31, 1901.

The hospital for native prisoners at the Carcel de Lingayen, P. I., is a large building with stone foundations and stone walls to the first floor. The ground floor is occupied as a general ward for the sick, except beri-beri patients. The floor above is used exclusively for beri-beri patients. There are two rooms; the large one, used as the general ward, is a light and airy room, with windows on all sides. Ventilation and sanitation are good. The small room is used for isolated cases. All the floors are wood. The sick sleep on bamboo bunks, with blankets and pillows; each one has a woolen blanket or bamboo mat. All food is cooked in the building and sufficient dishes are provided. One native acts as wardmaster, with four to assist as nurses. A native physician, with the assistance of a practicante, is employed to treat the sick under the supervision of the station surgeon. The service is now very sat-

No. 1.—WET BERI-BERI.

No. 2.—MIXED BERIBERI.

No. 3. A, MIXED BERI-BERI; B, WET BERI-BERI; C, DRY BERI-BERI.

No. 4.—THE POSITION TAKEN IN MIXED OR DRY BERI-BERI.

isfactory. An inspection of all buildings and grounds is made daily, and oftener if necessary. Complete records are kept.

The dispensary is well equipped with the necessary outfit and drugs, which are furnished on requisition from the civil funds.

The food is a great deal better than it was. If it were practicable to give the patients their native food it would be better, but I do not see how it can be done or how any improvement can now be made. The diet at first was mostly rice and salmon; it is now fresh beef, potatoes, tomatoes, beans, rice, salmon twice weekly, beef tea, hard bread, cream, coffee, and such vegetables as can be procured in the markets. The food is prepared by native cooks. It is a question if the food they were getting was the cause of the outbreak of beri-beri. My opinion is that the disease was caused by the bad sanitary conditions of the prison and grounds, together with the poor food, for since improvements have been made and the food changed there has been a gradual improvement in the health of the convicts, and while there has not been any case of beri-beri among the American prisoners, their general health has been better. In November there were at least five Americans in hospital daily, in January less than one on an average.

Beri-beri affects only the natives, and is the prevailing sickness. The epidemic started in the prison October, 1900. The following table shows the number of patients treated in the hospital since then:

	New cases.	Died.	Returned to duty.	Remaining sick.	Convalescent.
October, 1900	22	4	.....	18	.....
November, 1900	32	12	.....	38	.....
December, 1900	58	8	20	68	31
January, 1901	29	7	.....	90	45
Total	141	31	20	90	45
Time sick before death:					
Less than 1 month	.....	5	.....	.....	.....
1 month	.....	19	.....	.....	.....
2 months	.....	7	.....	.....	.....
Time in prison before taken sick:					
Less than 1 month	3	.....	.....	.....	.....
1 month	11	.....	.....	.....	.....
2 months	13	.....	.....	.....	.....
3 months	17	.....	.....	.....	.....
4 months	16	.....	.....	.....	.....
5 months	22	.....	.....	.....	.....
6 months or longer	41	.....	.....	.....	.....

This statement shows but 20 returned to duty. Many of those remaining as convalescent are comparatively well, but are kept in hospital until the improvements being made in the prison are finished. It requires at least three months for patients to recover fully. This disease has been classified by some writers as wet, mixed, and dry. This is a good classification and easily understood, as the terms clearly indicate the different conditions. The line can not be distinctly drawn between the wet and mixed. As I have seen it here in all its stages and tried to observe very carefully, I can not concur with the statement made by many that it is a multiple neuritis. I have made seven autopsies, finding the same effusion in the pericardial and pleural cavities, the pericardial sac in each case completely filled with fluid. (Specimens of these autopsies have been sent to the laboratory of the Army at Manila for examination.)

The fluid found in the cavities is the same in the wet as in the dry. The following photographs taken by myself show the different forms: No. 1. Wet beri-beri, under treatment in the hospital one month. The legs are œdematous and the face and neck much swollen, looking like mumps. In this case there is not, nor has been, any paraplegia; the first symptom was a numbness in both legs, no chill nor pain. There was no pitting on pressure, except along the sides of the crest of the tibia. The patient died suddenly five weeks after entering the hospital. The pericardial, pleural, and peritoneal cavities were filled with fluid of an amber color. No. 2. Mixed beri-beri. There is some œdema, not extensive, in both legs and not above the knees; the face and neck are swollen; there is almost complete paraplegia, the patient having been unable to walk for more than a month. Recovery in three months. This photograph was taken after he was in the hospital one month. No. 3. A. Shows mixed beri-beri with symptoms as in No. 2, except that the paraplegia was partial; his gait was as shown in the photograph. B. Wet beri-beri. This was the most severe case, with extensive œdema; the legs and thighs were swollen, also neck and face; there was no para-

plegia; his first symptoms were numbness in both legs, aching pain in the calves, and complete anæsthesia along both sides of the crest of the tibia so that a deep needle puncture was not felt. After the first few days the aching pain subsided, giving place to a pain in the same parts only when getting up or suddenly changing a position, but not while walking. Appetite good; bowels regular or somewhat constipated; no fever, the temperature usually subnormal. Pain over the heart and dyspnea very severe during the week before death. C. Dry beri-beri. No œdema, but complete paraplegia; general conditions atrophic. The paralysis was gradual, the patient becoming completely helpless during the third week. There was no numbness above the hips nor swelling of the face or neck; no chill nor fever. The disease was at its height during the eighth week, after which gradual recovery took place. No. 4 shows the position taken by a mixed or dry case. There is always a partial or complete paraplegia in the dry cases, in the mixed generally partial, and the wet seldom any. I saw 14 cases of dry beri-beri at Bigoa, province of Bulacan, all ages and sexes, all in one building; complete paraplegia in 10, partial in 4, with œdema in none; all recovered in three months. General symptoms: Weakness in both legs, aching dull pain in the calves (but no acute boring pain as in multiple neuritis). Numbness in the legs only; slight pitting on pressure on both sides and along the crest of the tibia and complete or partial anæsthesia here only. The first symptoms of all forms are about the same—there is no chill or fever, no gastric or intestinal disturbances or loss of appetite. After the first week the œdema in the wet will appear; in the mixed, œdema and loss of power in the legs; in the dry, an atrophic paralysis. About the fourteenth day the neck and face swell in the wet and mixed. There are no other special symptoms except the subnormal temperature of the body and in some cases constipation.

The following table shows the temperature of 10 patients for 10 days; the first 3 are mixed, 4 wet, and the remainder dry beri-beri:

Temperature, centigrade, taken every morning.

Day.	First.	Second.	Third.	Fourth.	Fifth.	Sixth.	Seventh.	Eighth.	Ninth.	Tenth.
1	36.2	36.5	36.3	36.2	36	35.7	36	36.5	36.5	35.8
2	35.4	36	36.2	36.8	35.6	36	36.5	35.8	36.1	36.2
3	35.8	35.3	36.4	36.4	36.2	36	35.9	36.1	35.8	36
4	35.5	36	35.8	35.9	35.7	35.6	36	36.4	35.7	35.8
5	36.5	36.7	35.1	35.3	36.1	37	36	35.9	36	36.2
6	35.8	36.5	36	36.7	36.3	37	36.2	37	36.7	37.1
7	36.2	37.5	36.7	36.7	37.5	37.5	37.8	37.1	36.2	35.4
8	36	35.5	35.4	35.7	36	36.2	36.1	36.6	36	35.4
9	37.2	36.8	36.2	36	35.6	36	35.8	36.5	35.5	36.3
10	36.3	35	35.4	35.2	35.4	35.7	35.7	36	36.1	35.9

While there is no chill, the patient suffers from cold at night with the temperature of the atmosphere from 26.7 to 30° C. The swelling of the face and neck causes no pain in mastication. Many physicians diagnose this as mumps. The œdema in the legs and feet is never as extensive in the mixed beri-beri as in the wet; in the mixed there is partial paraplegia about the fourteenth day. I have not seen complete paraplegia in this variety. In the wet variety there is seldom any paralysis; there is severe pain over the heart with dyspnea after the third week in these two varieties.

The wet cases are the most dangerous; during the fourth week the pain is very severe, the tongue is heavily coated, brown in the center, and pale on the edges. In these severe cases there is usually nausea and vomiting at this stage, followed by acute gastric pain; seldom any diarrhea. About the thirtieth day these patients will not remain on their bunks, but lie on the floor rolling around in their endeavor to breathe. The death is very painful and in many cases sudden. You will find patients, whom you think convalescent at night, dead in the morning.

The symptoms of the dry cases are about the same as those of the others. Anæsthesia along the crest of the tibia, weakness of the legs, and aching in the calves. Their general condition becomes atrophic; complete or partial paraplegia; slight pain over the heart about the twentieth day; no fever; temperature subnormal. These patients generally recover. All the difficult cases have a neurotic dermatitis on both lower extremities extending to the abdomen. The blood is watery. I made special examination of the blood of 35 different patients, the results being negative, except in a few cases. Eight culture tubes were prepared with gelatine meat as a medium for fresh blood from as many patients. In the eighth tube I succeeded in growing micrococci in pairs and irregular groups. The cell was about one-fourth the size of a red blood corpuscle. These cocci were also found in the white cells, which were in excess. Of the 35 cases, 4 showed these micrococci; they were stained with gentian violet. In the blood from the cadaver the same germ was found.

The urine of 10 cases was specially examined, 5 wet, 2 mixed, and 3 dry. The quantity was normal; color, pale amber; reaction, slightly acid. Albumen, 5 per cent in 2 specimens only; sugar, none; excess phosphates in 1; excess phosphates with bile in 1; no deposit in other specimens. In 3 cases micrococci were found in pairs and irregular groups like those observed in the blood. The stain was gentian violet.

It is impossible from my observation to fix any period of incubation. You will see by the table that most of the patients had been in the prison several months. The largest number had been exposed to the same conditions the longest time and among these were the greatest number of deaths.

Of the prisoners sent away for work, some developed the disease over one month after they left. Of 7 who were employed excavating the earth from one of the rooms, 5 were taken sick with the disease in less than one week. This might indicate that the germs were in the soil, and that these men were brought under the direct influence; in these cases the period of incubation might have been only a few days.

I have made seven autopsies, as follows:

Case 1.—Wet beri-beri; sick one month; died suddenly from syncope. Maculæ and ulcers on the lower extremities and abdomen; œdema of both legs, extending to thighs. Abdomen distended with fluid; swelling of both sides of face and neck. The tissues were filled with fluid blood. Lungs normal, with no adhesions; pleural cavity partially filled with fluid. Pericardial sac was distended with fluid; heart enlarged; walls thin; both sides filled with blood; no clots. Aorta also filled with blood. Liver enlarged and congested. Kidneys normal, with no congestion. Spleen normal. Cerebral cavity filled with fluid; brain congested.

Case 2.—Wet beri-beri; died suddenly. General œdema. Maculæ and ulcers on both legs and abdomen. This patient was brought to the post guardhouse as a witness, and it was not known that he was sick. He was taken with severe dyspnea and cardiac pain, and died in four hours. The abdomen was distended with fluid; the tissues were congested; but there was very little blood in the large vessels. The pericardial sac was distended with fluid; heart enlarged and filled with liquid blood; no clots; walls thin. There were peculiar white spots on the surface of the heart. Left lung normal; right lung adherent and with tubercles in many parts; spleen enlarged to at least one-half its normal size; liver enlarged, adherent, and congested; kidneys normal. Spinal canal filled with fluid.

Case 3.—Mixed beri-beri. Some œdema of lower extremities; maculæ and ulcers of both legs and abdomen. There had been complete paraplegia. Tissues and vessels filled with fluid blood. Pericardial sac filled with fluid; heart filled with blood both sides; walls thin; no clots; aorta and venæ-cavæ filled with fluid blood. Left lung normal; right slightly adherent; very little fluid in pleural cavity. Spleen enlarged to three times its normal size. The cerebral cavity contained a large quantity of fluid; brain congested; calcareous deposits on dura mater.

Case 4.—Mixed beri-beri. General appearance as in the other cases. General congestion; heart filled with fluid blood; very little fluid in sac; no clots; left lung normal; right lung adherent and in second stage of pneumonia; the whole lung involved.

Case 5.—Wet beri-beri. Complete rigor mortis. (This is the only case in which there was any rigor mortis eight hours after death.) Œdema extensive, chiefly in lower extremities, abdomen, and face. Tissues and vessels filled with fluid blood; pericardial sac distended with fluid; heart enlarged; right side filled with fibrinous clots; left side, fluid blood only; left lung adherent, upper lobe congested; right lung in second stage of pneumonia, whole lung involved; intestines congested. Spleen enlarged to twice its normal size; liver enlarged and congested. There was partial paraplegia four weeks before death.

Case 6.—Six hours after death. Dry beri-beri. Emaciated. Vessels and tissues congested. Heart enlarged; very little fluid in the sac; both auricles contained large fibrinous clots; none in ventricles, which were filled with fluid blood. Lungs normal, no adhesions or congestions; spleen enlarged to four times its normal size; kidneys normal. Cerebral cavity contained but little fluid; brain and spinal cord congested. This patient had partial paraplegia at least two weeks before he died.

Case 7.—Dry beri-beri. Sick five weeks; partial paraplegia; no œdema. All vessels filled with fluid blood. Large quantity of fluid in pleural cavity; right lung, normal; left lung, adherent, lower and middle lobes in third stage of pneumonia; tissues breaking down and filled with exudate; pericardial sac filled with fluid; right side of heart filled with fibrinous clots, left side with fluid blood.

It will be seen that in all these cases the pericardial sac was distended with fluid, and the vessels filled with fluid blood.

Specimens of all the organs and of the spinal cord have been sent to the laboratory of the army for examination.

LEPROSY.

Occasionally references are found in inspection reports to the prevalence of leprosy among the natives in the vicinity of garrisoned posts. The following is from a report on the military hospital at Cebu, P. I., by Maj. L. M. Maus, sanitary inspector of the Division of the Philippines, dated July 17, 1900:

Leprosy is a common disease among the inhabitants of this island, and many cases are found scattered along the seashore in the various pueblos. The town of Cebu contains an old leprosy hospital which was established in 1852, and is capable of caring for about 100 cases. This institution is located about one-half mile outside of the town, along the seashore. I found numerous cases of leprosy along the roadside during my visit to this lazaretto, among whom were many children, generally engaged in begging. I understand that the city ordinances do not permit lepers to enter the city, and that a deadline has been established at a certain point. The leprosy hospital was formerly allowed $1,842 annually by the Spanish Government, the deficit being made up by the friars who had charge of the institution. The hospital contains about 80 people, equally divided among the two sexes. Many of the patients are children from 8 to 14 years old. The disease appears mostly in the tuberculous form, many nodules appearing on the face and lobes of the ears. In many instances the nose had sunken. Quite a large percentage of the feet were affected, and in a number of cases the toes had gone. Beyond shelter and spare food nothing is done for these unfortunates. Colonel McClernand has constructed a large nipa barrack near the hospital, about 250 feet long and 20 feet wide, around which he intends to construct a barricade. After the completion of this he intends to segregate and take care of all the lepers in the town and its immediate environment. He has allowed 6,000 pesos annually for the support of these people, which he turns over to the priest who has charge of this work. I understand that there are between 200 and 300 lepers in Cebu and its suburbs. The work Colonel McClernand is performing is praiseworthy, but much better results could be obtained were the entire matter turned over to the medical department.

A plan for the segregation and care of the lepers of the Philippine Islands was submitted June 4, 1900, by the chief surgeon to the military governor. This met with the approval of the latter, and on June 18 an order was issued convening a board of officers to select an island suitable for the purpose and to formulate working plans for the establishment of a leper colony, including estimates for suitable buildings, for the salaries of the necessary officials and employees, and for the rations and other allowances for the support of the establishment. The board consisted of Maj. Louis M. Maus, surgeon, United States Army, Capt. George P. Ahern, Ninth United States Infantry, and Capt. W. E. Horton, assistant quartermaster, United States Volunteers.

Pursuant to instructions from the military governor, the board embarked on the U. S. gunboat *General Alava* for the purpose of visiting the islands previously selected for investigation and designated by the military governor in a letter to the admiral commanding the fleet. The islands thus designated were Lubang, Ylin, Maestro de Campo, Bantayan, Camotes, and Linapacan, all of which were visited and investigated except the last, which was stricken from the list by the naval commander, as it lay outside of the route the vessel was expected to take in the delivery of stores to the naval vessels in southern waters. The following are the conclusions submitted by the board on the completion of this voyage of inspection:

In consideration of the large number of lepers reported in the archipelago (about 30,000), and the various racial elements represented, the board fully appreciates the difficulties in the selection of a single island for this colony. Besides its agricultural advantages, fertility of soil, variety of products, etc., an island suitable must possess a sufficient area to maintain a population of probably 40,000 people, for undoubtedly a large number of families of these unfortunates will follow them into voluntary

exile. It should also be capable of varied products such as rice, corn, potatoes, tobacco, hemp, garden vegetables, and the different fruits. An island whose main product is rice would hardly be suitable, when we consider the hard labor entailed in its culture and the character of the colonists, most of whom being weaklings. So far the board has found no suitable single island, except one containing a large or fairly large population, the compulsory removal of which might be questionable. The islands of Ylin, Maestro de Campo, and Bantayan are considered unsuitable for the following reasons: Ylin, on account of its physical features and lack of agricultural lands; Maestro de Campo, its inferior size; and Bantayan, its large population (about 20,000). Sibuyan is quite large and populous, and generally speaking is covered with mountains and forests, and contains only a small amount of agricultural land, which is well settled. While we only examined one side of the island, we do not regard it as suitable. The Camotes group, however, appear to possess all the necessary requirements for the establishment of a self-supporting colony, such as size, fertility of soil, variety of products, location, isolation, water, timber, and healthfulness. Two of these islands, Paciyan and Porro, will in all probability meet all the requirements of the colony for the next twenty-four years and be able to maintain a population of 30,000. The population of these two islands has been estimated as 13,000 people. While Lubang possesses a number of advantages—location, size, products, etc.—the board does not feel justified in coming to definite conclusions in regard to its suitability without further investigation, but it is believed capable of supporting a population of 20,000 were the resources of the island developed. General Kobbe, of the Army, and Captain Bleeker, of the Navy, highly recommend the island of Cagayan de Sulu (Jolo) for the colony. This island is situated on the extreme southwestern portion of the archipelago, north of Borneo; is about 6 miles in length and width; contains about 2,000 Moros; is said to be fertile, cool, healthy, and otherwise suitable. The bishop of Cebu very strongly recommends the island of Sikujor, a large island lying north of Mindanao, but it is said to contain a population of 40,000 people. Professor Worcester speaks very highly of the Kalamianes group, which lies on the twelfth parallel, about 50 miles southwest of Mindoro. This group contains the islands of Busuanga and Caleon, besides a number of small islets. Professor Worcester, who has visited them several times, informed us that they were fertile, healthy, and very sparsely inhabited. The board would have visited them during the trip had it not been contrary to orders received by the commanding officer of the ship. In conclusion, the board deems it best that its final action in regard to selection be deferred until the Kalamianes group and the islands of Cagayan de Sulu be examined and Lubang more fully investigated. Should the removal of the population of the island of Sikujor be not considered objectionable, it also recommends that it be included in the list for examination.

The subject was again taken up on January 3, 1901, by the issuance of an order from the office of the military governor directing the board to inspect the islands of Culion, Busuanga, and Cagayan de Jolo, and to make such further examination of the island of Tubang as might be deemed necessary. The board was called upon on its return to Manila to report not only on a suitable site for a leper colony, but on the relative advantages of each of the islands visited for the establishment of a penal colony. Transportation having been provided by the gunboat *General Alava*, the board made its second voyage of inspection, and on its return to Manila submitted a full report, the conclusion and recommendations of which were as follows:

Including those examined on a previous visit of the board, July 5 to 24, 1900, the following islands so far have been inspected and considered: Bantayan, Busuanga, Cagayan de Jolo, Campo de Maestro, Culion, Comotes, Cuyo, Ylin, Linapacan, Lubang, and Sibuyan. All of these islands have been visited once by the board and examined with more or less care, Lubang having been visited twice. In consideration, however, of the brief period allotted the board, less than one month for both visits, it will be readily understood that but little time could be devoted to the close inspection of each island. After having carefully considered the special or superior advantages of each island inspected for the purpose of establishing a colony for lepers the board unanimously recommends Cagayan de Jolo. This island is believed to possess all the qualifications required—size, fertility of soil, variety of products, healthfulness, and geographical location. Its unique position in the archipelago and distance from other islands peculiarly fit it for this purpose. Besides, its selection would

disturb few people and practically involve no property interests, since the population consists only of a few hundred semicivilized Moros, who apparently claim nothing more than the sites upon which their huts are located. If the selection of this island as a colony for the segregation of the lepers of the archipelago meets with the approval of the governing authorities, the board recommends that immediate steps be taken to place it in condition for their reception. It is believed that the appropriation of $25,000 Mexican currency would be sufficient to place the island in a suitable condition for the reception of lepers now confined in the various lazarettos on the island. The present occupants should be removed to Palawan, or the Jolo group, which it is believed could be done with little expense. It is not regarded advisable at present to submit estimates for the erection of permanent buildings or the construction of roads, wharves, water system, and other expensive improvements. The huts now occupied by the natives could be utilized by the less serious cases, while the nipa barrack should be constructed for those requiring constant care. In addition to the barrack or hospital a few buildings should be erected for the use of the superintendent, physicians, druggist, school-teachers, foremen, padre, and employees, and a large go-down for supplies and stores, these buildings to be constructed of material similar to that used in the buildings now on the island. It is believed that 1 superintendent, 2 native physicians, 1 school-teacher, 2 foremen, and 25 laborers, including carpenters, would be sufficient to start the colony.

The suitability of the various islands examined, for the establishment of a penal colony, depends on the rules instituted for its government. Should it be intended simply as a place for isolation and detention, in penitentiaries and stockades, in all probability the island of Penon de Coron would be most suitable.

On the other hand, should it be intended to establish a colony where the labor of the convicts could be utilized in chain gangs for the cultivation of the soil, felling timber, building of roads, etc., it is believed that Busuanga would prove best adapted.

On account of its isolation and fertility Cagayan de Jolo is also admirably suited for this colony, but would serve a better purpose for the segregation of the lepers.

On account of Cuyo's large population and Linapacan's physical features, these islands can not be considered. Culion is rich, fertile, and would be well adapted, provided the colony was limited in number. The establishment of the colony on Lubang would in all probability entail the expenditure of large sums to pay for property owned by the church and private individuals and for the removal of the present population, unless it was intended to construct penitentiaries there for the confinement and isolation of the convicts.

On account of the favor with which the island of Cagayan de Jolo was regarded by the board, the following from the report on this island is submitted:

This beautiful little island lies in 70° N. latitude and 118° 30′ E. longitude, is about 8 miles long from east to west and 5 miles broad from north to south. Except for a few small islets, Cagayan de Jolo occupies a very isolated position, lying as it does in the center of the Mindoro Sea, almost midway between Palawan on the west and the Sulu group on the east. It is about 75 miles north and east of Borneo. The surface of the island, generally speaking, consists of gently undulating plains, covered with a heavy growth of cojon, with here and there a large tree or a small grove of cocoanut trees, which add immensely to the picturesqueness of the landscape. To the west and south the terrene gradually ascends to elevations which might be designated as mountains, though it is a question whether any point rises higher than 1,000 feet above the sea level. The soil appears rich, is reddish in color, and contains loam, clay, and sand. Although very little in the way of agricultural development has taken place, it is believed that the island is highly susceptible of cultivation, and that almost everything grown elsewhere in the archipelago can be raised here—cocoanuts, bananas, oranges, cajeles, corn, sweet potatoes, gabe, cocoa, rice, sugar cane, hemp, cotton, and all kinds of garden vegetables. Cocoanut trees were observed growing luxuriantly on the highest ranges of hills. There were evidences of sugar plantations long since overgrown with rank growth of cojon. The inhabitants consist of about two or three hundred uncivilized Moros, who live in thatched huts in the most primitive way. They cultivate very little ground, and appear to subsist principally on fruits, roots, fish, and mollusks. Their houses are small, low, and generally consist of one apartment, which contains very little in the way of furniture or household articles, and are very dirty. An occasional cow or carabao and a few chickens were noted on the island. We met a few of the natives, but as they were unable to speak any language that was intelligible to any member of our party, which included Spanish, Tagalo, and Visayan, we were unable to communicate with them. They are lazy, indolent, and semicivilized, and should be placed very low in the scale of humanity. It is questionable whether a single inhabitant of the island can read or

write. All the males were armed with well-kept and sharpened boronga and lances, from which they could not be induced to part for any money consideration. As far as we were able to learn no running streams were found to exist in the island, certainly none on the plains, though there may be some in the mountain districts. The drinking water is procured from wells. A spring has been reported by sailing masters to exist on the south and west shore of the island. The craters of two large and extinct volcanoes exist on the southern shore, the other being perfectly landlocked, though equally filled with water, which appears to be on a level with the sea. Both of these lakes are very deep, and the interior one is said to contain fresh water.

There appears to be no good harbor in the island, and the shore is surrounded by a coral reef, which extends out from one-half to 1 mile, except on the northwest and southeast coast. Good anchorage for ordinary commercial vessels can be obtained within 500 yards off the south shore near the two volcanic lakes. The best anchorage during the northeast monsoon is on the west side of the island, where an anchorage can be obtained in 9 or 10 fathoms.

INJURIES.

The admission, discharge, and death rates from injuries in the Army as a whole in 1900 were, respectively, 196.27, 4.89, and 6.95 per thousand of the strength, as compared with 192.47, 4.47, and 6.67 in 1899, and 232.75, 3.10, and 2.74, the mean annual rates of the decade 1889–1898. The troops in China, Cuba, and the United States had larger admission rates than the rate of the Army as a whole; those in the Philippines and Porto Rico had smaller rates. The discharge rate and death rate in China were unusually high, as also was the death rate among the volunteers in the Pacific Islands.

Table showing the number of admissions, discharges, and deaths caused by the prominent classes of injury, with the ratios per thousand of strength, among the troops serving in the United States and among those on insular or foreign service, year 1900.

Place of service and causes of admission.	Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Army:						
Contusions and sprains	7,572	75.42	4	0.04	.....	.....
Abrasions, blisters, burns, and scalds	2,515	25.05	.....	.....	1	0.01
Wounds, contused, lacerated, and punctured	2,352	23.43	6	.06	5	.05
Wounds, gunshot	1,173	11.69	235	2.34	471	4.69
Total injuries	19,703	196.27	491	4.89	698	6.95
United States:						
Contusions and sprains	2,761	133.43	2	.10	.....	.....
Wounds, contused, lacerated, and punctured	777	37.55	3	.14	2	.10
Total injuries	5,547	268.10	140	6.77	61	2.95
Cuba:						
Contusions and sprains	1,249	143.72	1	.12	.....	.....
Wounds, contused, lacerated, and punctured	366	42.12	1	.12	.....	.....
Wounds, gunshot	29	3.34	5	.58	3	.35
Total injuries	2,493	286.88	29	3.34	12	1.38
Porto Rico:						
Contusions and sprains	24	11.01	.....	.....	.....	.....
Wounds, contused, lacerated, and punctured	42	19.27	.....	.....	.....	.....
Wounds, gunshot	12	5.50	1	.46	.....	.....
Total injuries	393	180.27	3	1.38	.....	.....
China:						
Contusions and sprains	100	51.36	.....	.....	.....	.....
Exhaustion from exposure and fatigue	97	49.82	.....	.....	1	.51
Wounds, gunshot	182	93.47	38	19.52	42	21.57
Total injuries	627	322.03	40	20.54	47	24.14
Pacific Islands (volunteers):						
Contusions and sprains	1,440	45.81	1	.03	.....	.....
Abrasions, blisters, burns, and scalds	990	31.50	.....	.....	.....	.....
Wounds, gunshot	609	19.37	50	1.59	255	8.11
Total injuries	5,288	168.23	87	2.77	354	11.26
Pacific Islands (regulars):						
Contusions and sprains	1,811	51.09	.....	.....	.....	.....
Abrasions, blisters, burns, and scalds	760	21.44	.....	.....	1	.03
Wounds, gunshot	284	8.01	119	3.36	150	4.23
Total injuries	5,355	151.06	192	5.42	214	6.04

RADICAL CURE OF HERNIA.

The following operations for the radical cure of hernia were performed or reported during the year ending June 30, 1901:

Name.	Organization.	Age.	Hernia.	Date of operation.	Operator.
A. E.	Pvt., D, 5th Inf.	22	Right inguinal	June 29, 1900	W. H. Block, contract surgeon, U. S. A.
H. J. Y.	Elect. Sergt.	25	Left inguinal	July 18, 1900	
P. P. F.	Pvt., B, 4th Art.	24	Right inguinal	July 23, 1900	
J. F. L.	Civilian	36	Left inguinal	Sept. 11, 1900	
C. A. L.[1]	Pvt., Hosp. Corps	21	Right inguinal	Sept. 18, 1900	
F. D.	Pvt., O, 4th Art.	37	Left inguinal	Sept. 25, 1900	
J. C. C.	Pvt., D, 7th Art.	21	Double inguinal	Oct. 5, 1900	
W. F. S.	Rect., unassigned.	22	Right inguinal	Oct. 19, 1900	
G. P. M.	Civilian	21	Double inguinal	Oct. 23, 1900	Maj. W. C. Borden, surgeon, U. S. A.
A. H.	Pvt., F, 2d Art.	24	do	Oct. 26, 1900	
G. W. B.	Sergt., F, 7th Art.	29	Right inguinal	Nov. 9, 1900	
G. J. N.	Capt. Med. Dept.	36	Double inguinal	Nov. 23, 1900	
A. S. B.	Sergt., K, 4th Art.	25	Left inguinal	Dec. 21, 1900	
W. F. S. L.	Pvt., D, 19th Inf.	31	do	Dec. 28, 1900	
J. H. G.	Pvt., D, 7th Art.	22	Right inguinal	Jan. 25, 1901	
R. P.	Pvt., 37th Co. C. Art.	47	Left inguinal	Feb. 22, 1901	
F. G.	Pvt., A, 8th Inf.	22	Right inguinal	Nov. 14, 1900	
E. K. J.	Pvt., Hosp. Corps	31	Ventral	Dec. 4, 1900	Capt. A. E. Bradley, assistant surgeon U. S. A.
W. J. McC.	Pvt., F, 1st Cav.	47	Left inguinal	Jan. 14, 1901	
J. L. O'C.	Pvt., I, 10th Inf.	25	Right inguinal	Sept. 7, 1900	
G. H.	Pvt., I, 10th Cav.		do	Oct. 25, 1900	Maj. L. C. Carr, surgeon, U. S. V.
C. B.	Pvt., C, 45th Vol. Inf.	24	Left inguinal	Jan. 29, 1901	First Lieut. C. R. Darnall, assistant surgeon, U. S. A.
A. B. B.	Corpl., F, 31st Vol. Inf.	23	Right inguinal	Feb. 11, 1901	
C. M. T.	Pvt., H, 31st Vol. Inf.	30	do	do	
H. H.	Pvt., B, 5th Cav.	29	Double inguinal	Sept. 10, 1900	Capt. C. E. B. Flagg, assistant surgeon, U. S. A.
J. F. S.	Sergt., A, 2d Inft.		Ventral	do	Capt. E. B. Frick, assistant surgeon, U. S. A.
R. B.[1]	Pvt., B, 16th Inf.		Right inguinal	July 28, 1900	
F. C.	Pvt., C, 18th Inf.		Left inguinal	Aug. 6, 1900	
A. A. C.	Pvt., Hosp. Corps		Right inguinal	Aug. 18, 1900	
J. G.	Pvt., A, 18th Inf.		do	July 26, 1900	
G. G.	Civilian		Left inguinal	Aug. 15, 1900	
J. A. J.	Sergt., A, 35th V. I.		Right inguinal	Aug. 8, 1900	
R. G. L.	Pvt., A, 4th Cav.		Left inguinal	Aug. 1, 1090	
C. C. P.	Act. hosp. steward		Double inguinal	Aug. 21, 1900	
R. R.	Pvt., K, 35th V. I.		Right inguinal	Aug. 16, 1900	
R. B. S.	Civilian		Left inguinal	July 28, 1900	
G. W. S.	Pvt., F, 33d V. I.		do	Aug. 9, 1900	
O. S.	Pvt., M, 7th Inf.		Right inguinal	Aug. 22, 1900	
E. A.	Mus., A, 18th Inf.		Left inguinal	Nov. 12, 1900	
J. A. G.	Pvt., H, 27th V. I.		do	Oct. 21, 1900	
H. R. G.	Pvt., H, 6th Art.		Ventral	Oct. 17, 1900	Lieut. Col. A. C. Girard, deputy surgeon-general, U. S. A.
C. H.	Pvt., I, 35th V. I.		Right inguinal	Oct. 2, 1900	
R. LaP.	Pvt., Hosp. Corps		do	Oct. 3, 1900	
R. W. P.	Corpl., M, 9th Cav.		do	Sept. 19, 1900	
G. S.	Civilian	11	do	Oct. 21, 1900	
C. E. S.	Pvt., M, 19th Inf.		do	Sept. 17, 1900	
F. M.	Pvt., M, 29th V. I.		Ventral	Feb. 13, 1901	
J. T.	Discharged soldier		Double inguinal	Jan. 8, 1901	
R. R. A.	Pvt., Bd., 32d V. I.		Left inguinal	Feb. 9, 1901	
G. A.	Discharged soldier		Right inguinal	Dec. 27, 1900	
Z. W.	Pvt., H, 29th V. I.		do	Feb. 7, 1901	
T. S.	Discharged soldier		Ventral	Jan. 9, 1901	
J. L.	Pvt., A, 21st Inf.		Left inguinal	Dec. 12, 1900	
F. D.	Discharged soldier		do	Dec. 19, 1900	
J. G.	Pvt., L, 4th Cav.		do	Dec. 6, 1900	
C. B.	Discharged soldier		Ventral	Feb. 23, 1901	
C. F.	do		Right inguinal	Feb. 12, 1901	
S. W.	Civilian		Left inguinal	Mar. 1, 1901	
G. C.	Pvt., E, 5th Art.	37	Right femoral	Jan. 30, 1901	Capt. D. C. Howard assistant surgeon U. S. A.
F. A. K.[1]	do	27	Right inguinal	Feb. 15, 1901	
J. W. Van N.	Pvt., K, 1st Art.		Left inguinal	Dec. 18, 1900	J. S. Kennedy, contract surgeon, U. S. A.
B. D. J.	Pvt., A, 10th Cav.	29	Right inguinal	Feb. 22, 1901	First Lieut. Ira M. Shimer, assistant surgeon, U. S. A.
W. B.	Corpl., D, 7th Cav.	22	do	Dec. 4, 1900	Capt. A. N. Stark assistant surgeon U. S. A.
G. A. J.	Pvt., H, 2d Art.		do	Jan. 26, 1901	
C. L.	Pvt., E, 2d Cav.	23	Ventral	Sept. 20, 1900	First Lieut. J. Hamilton Stone, assistant surgeon, U. S. A.
J. B.	Civilian	12	Double inguinal	Jan. 9, 1901	
P. F.	Pvt., I, 2d Cav.	22	Left inguinal	Aug. 7, 1900	

[1] Recurrence of hernia.

In September, 1895, after fully considering the results attained by surgical treatment in the radical cure of hernia, together with the small amount of risk involved in the operation as now conducted under careful aseptic supervision, I came to the conclusion that the operation might be made available to preserve good soldiers, although ruptured, in the service, and to lessen the number of men discharged for disability and then pensioned for hernia. The annual loss of men by rupture has always been considerable. During the six calendar years ending December 31, 1894, 153 men were discharged. I did not consider that the progress of surgery warranted a resort to operative proceedings in all cases, but felt confident that surgical interference would enable many to continue in the military service or earn their livelihood with comfort in civil life who are now discharged and pensioned for hernia. Accordingly, on September 9, 1895, the following was published from Headquarters of the Army, Adjutant-General's Office, as Paragraph II of Circular No. 9, of that date:

II. Treatment of enlisted men who have been ruptured in the line of duty.

Cases of hernia suitable for an operation should receive surgical treatment, which, by the most approved modern methods, is successful in a large proportion of the cases operated upon, and in skillful hands is attended with little risk.

Operations for the radical cure of hernia will be performed, with the consent of the soldier, by medical officers specially designated by the Surgeon-General of the Army.

Medical officers will report cases of hernia considered favorable for operation to the Surgeon-General.

If the case is considered unsuitable for operation, or if an operation is declined by the soldier, the fact will be noted upon the certificate of disability. (Decision Acting Secretary of War, August 14, 1895, 19166, A. G. O., 95.)

Since then 336 men belonging to the Regular Army have been operated on for the radical cure of hernia. Medical officers have reported also 71 cases among civilians and 59 cases among volunteer troops.

Of the 71 cases among civilians the records show that the patients varied in age from 5 to 64 years, but most of them were cases of inguinal hernia in discharged soldiers. Sixty-nine left the military hospital cured or in good condition at the end of from eighteen to one hundred and five days, but the records are unsatisfactory, as they do not follow up the subsequent histories. How many recurrences may have taken place is unknown. Of the 69 cases, 3 were double operations on inguinal hernia, 1 was a case of umbilical hernia in a female 28 years of age, and 2 were cases of hernia at the site of operations for appendicitis respectively nine and ten months prior to the hernial operation. In 1 of the 69 cases the patient, a discharged soldier, aged 42, is now drawing a pension of $6 per month for tender cicatrix—"Hernia cured, but suffers from pain in cicatrix, which occasionally suppurates."

Two untoward results occurred in these 71 cases: A patient 61 years of age died from profound shock on the day following the operation. The other, a discharged soldier, died from congestion of the lungs three days after the hernial operation. He had just returned from the Philippines and had been dissipating heavily in San Francisco prior to the operation.

Fifteen of the 71 cases were operated upon by Col. W. H. Forwood, assistant surgeon-general, United States Army; 14 by Lieut. Col. A. C. Girard, deputy surgeon-general, United States Army, and 9 by Maj. W. C. Borden, surgeon, United States Army.

The 59 cases among the volunteer troops were reported chiefly from

Washington, D. C.; San Francisco, Cal., and Santiago, Cuba, Col. W. H. Forwood, assistant surgeon-general, and Maj. W. C. Borden, surgeon, United States Army, being the operators at the first-mentioned station; Lieut. Col. A. C. Girard, deputy surgeon-general, at the second, and Maj. L. C. Carr, surgeon, United States Volunteers, at the last. Of this series all were cases of inguinal hernia except one—a protrusion at the site of an operation for appendicitis performed one year prior to the operation for the rupture. One of the cases was a double inguinal operation. One case, operated on March 20, 1899, was discharged by order "hernia disabled" April 10, 1899, the short time elapsing between the operation and the discharge leaving it uncertain as to whether the operation was ultimately a success or a failure. The men in two other instances were mustered out shortly after the operation, with disability marked "one-fourth" in one instance and "total" in the other. Of the remaining 56 cases all were reported as in good condition at the time of muster out or other discharge from service at periods varying from thirteen days to six months and twenty-one days after operation. It has not been practicable to follow up the histories of these cases.

We have, however, a very satisfactory knowledge of the condition of the 336 cases of men belonging to the Regular Army operated on for the radical cure of hernia—gained from the muster rolls and medical records, and, in many instances, by special inquiries. Of these 336 cases no recurrence of the hernia or bad effect from the operation has been reported in 300. In 99 of the 300 a period of six months or less has elapsed since the operation was performed; in 50 a period of six to twelve months, in 80 a period of one to two years, and in 71 a period of over two years. This must be regarded as a very satisfactory result of surgical intervention to save trained soldiers for a continuance of their military career, particularly when it is recognized that 10 of the remaining 36 cases were radically cured by a second operation, 13 were discharged for disability, they having declined to submit to a second operation, 6 for tender cicatrix resulting from the operation, and 2 for weakness of the abdominal wall, rendering them unfit for the arduous duties of the military service; 4 were retained in service, and 1 case terminated fatally from suppression of urine.

Among these 36 cases, to which special attention is invited, recurrence of the hernia was reported in 21 cases at varying periods after the operation. In 10 cases within six months (mean, three and a half months); in 4, within six to twelve months (mean, eight months); in 5 within one to two years (mean, fifteen months); and in 2 after two years (mean, twenty-nine months). Of the 10 cases in which recurrence took place before six months had elapsed, 5 cases (Nos. 18, 107, 234, 244, and 253) were discharged on surgeons' certificates of disability; but in the 4 cases (Nos. 52, 84, 240, and 252) a second operation was successful, so far as shown by the records, and in the remaining case (No. 201) the patient, an old soldier, was placed on the retired list.

Of the 4 cases of recurrence between six and twelve months after the operation, 2 cases (Nos. 70 and 254) were discharged on certificates of disability; Nos. 80 and 210 remained in service.

Of the 5 cases of recurrence between one and two years after operation, 1 (No. 68) was discharged for disability, but in 4 (Nos. 105, 155, 218, and 267) a second operation was successful.

Of the 2 cases of recurrence after two years or longer, 1 case (No.

42) remains in service, and the other case (No. 121) was discharged for disability.

Thus of the 21 cases of failure in the primary operation in 336 operations, the men in 9 cases were discharged for disability, a second operation not having been undertaken, 8 were returned to effective duty after a second operation, and 4 were retained in service in no worse condition than before the unsuccessful operation.

There were also 2 cases (Nos. 276 and 328) in which it can scarcely be said that a recurrence took place, but rather that the primary operation was unsuccessful. In one of these cases a second operation appears to have been performed, and in the other a third operation before a cure was effected.

Among the 36 cases, 23 of which have already been noted, there were 4 cases that must be regarded as unsuccessful (Nos. 7, 43, 91, and 108) as the patient in each case was discharged from hospital, declining a second operation, on certificates of disability for rupture. Six cases (Nos. 36, 49, 53, 54, 231, and 246) must also be regarded as unsuccessful, for the men were afterwards discharged on certificates of disability for tender cicatrix. In 2 cases (Nos. 95 and 167) although the result was good so far as concerned the cure of the rupture, the men were discharged from the service on account of weakness of the abdominal walls. The case of death (No. 170) is specially reported below.

THE THIRTY-SIX SPECIAL CASES.

Case 7.—Discharged on certificates of disability for inguinal hernia and swollen and sensitive testicle after four months of hospital treatment subsequent to the operation.

Case 18.—Recurrence four months and three days after operation or one month after leaving hospital. Discharged on certificates of disability; declined a second operation.

Case 36.—Discharged on certificates of disability for tender cicatrix, etc., over twelve months after the operation, during most of which time he was under treatment in hospital.

Case 42.—Recurrence twenty-eight months after operation or twenty-five months after leaving hospital. The patient in this instance was an officer, who is still in the service.

Case 43.—Discharged on certificates of disability four months after the operation. During most of this time he was under treatment in the hospital.

Case 49.—Discharged on certificates of disability for tender cicatrix four and one-half months after the operation or about two months after leaving hospital.

Case 52.—Recurrence from strain May 22, 1900, three and one-half months after operation. A second operation was performed June 26, 1900. No recurrence.

Case 53.—Discharged on certificates of disability for painful cicatrix four and one-half months after operation and two and one-third months after leaving hospital.

Case 54.—Discharged on certificates of disability for painful cicatrix seven months after operation and two months after leaving hospital.

Case 68.—Recurrence twelve and one-third months after operation or ten and one-half months after leaving hospital for duty. Patient declined a second operation and was discharged on certificates of disability fifteen days later.

Case 70.—Recurrence nine and one-half months after operation or eight and one-third months after returning to duty. He declined a second operation and was discharged on certificates of disability eleven days later.

Case 80.—Recurrence eight and one-half months after operation or four months after leaving hospital for duty. The patient in this case, a commissioned officer, refused a second operation and is now in service wearing a truss.

Case 84.—Recurrence by probable carelessness of patient seven weeks after operation and twelve days after leaving hospital. A second operation was immediately performed. An examination April 27, 1901, nine months after this operation, found the parts sound and with no disposition for the hernia to recur.

Case 91.—Operation not successful. Patient discharged on certificates of disability for hernia.

Case 95.—An operation for hernia in the cicatrix of an appendectomy. Result

reported good so far as concerns the hernia, but the soldier was discharged on certificates of disability for "weak abdominal walls."

Case 105.—First operation December 12, 1895; second operation for relapse February 3, 1897. No recurrence up to December 3, 1897, when the man deserted.

Case 107.—Recurrence two and one-fifth months after operation or seventeen days after leaving hospital for a status of duty. A second operation declined. Discharged on certificates of disability for hernia.

Case 108.—Operation unsuccessful. Discharged on certificates of disability for hernia after nearly nine months in hospital.

Case 141.—Operation February 22, 1897; returned to duty March 20, 1897. No special report of the recurrence, but the Adjutant-General's records show the man to have been discharged September 2, 1899, on certificates of disability for hernia.

Case 155.—Operation March 28, 1899; discharged by order May 9, 1899. Reenlisted. Recurrence December 6, 1900. Second operation December 17, 1900; to duty February 1, 1901. No recurrence as yet reported.

Case 167.—Discharged on certificates of disability for weakness of the abdominal wall eight weeks after an operation for a hernia at the site of previous operations on the appendix.

Case 170.—As death occurred in this case, the report of the operator is given in full. I have the honor to submit the following report in the case of Private C. O. M., Third Cavalry, who was operated on for hernia at this hospital May 30, 1900, and died of acute nephritis on June 6, 1900:

Private M. reported at this hospital from Fort Totten, N. Y., per instructions from the Adjutant-General's Office, dated May 10, 1900, for operation for the radical cure of hernia, his diagnosis being "double inguinal hernia," contracted in line of duty while serving in Cuba in 1898. He was placed under observation preparatory to operation. On May 17 and 21 he had slight attacks of tertian malarial fever, his temperature rising to 102. The malarial parasite was found in his blood. Operation was deferred to insure cure of the disease before subjecting the patient to a surgical procedure. On May 26 he was discharged from the service, and reenlisted on May 28 for the Third Cavalry. At the time of his discharge he was allowed to leave the hospital to settle his final statements, and from what was learned afterwards he indulged quite freely in alcoholic liquors and had sexual intercourse, from which the gonorrhea, which subsequently developed, was contracted. On his return to the hospital he appeared to be in good condition, and I operated on May 30, doing a double operation, as he had indirect inguinal hernia on both sides. Post operative temperature was quite high, reaching 103 degrees in the afternoon of the day of the operation. He passed 12 ounces of urine that night, and the next morning his temperature dropped to 99 degrees. On May 31, the day after the operation, he passed 24 ounces of turbid urine. He appeared to be in fair condition, his temperature in the evening being 98.6. The next day his morning temperature was subnormal, 96.2. There was a profuse discharge from the urethra, in which numerous gonococci were found, and on inquiry the patient gave the history of the possible venereal infection before referred to. His urine had diminished in quantity, 12 ounces in 24 hours, and microscopical examination showed a great many blood cells with granular and epithelial casts. His temperature in the evening was 99.6. On June 2 and 3 he had practically suppression of urine, but a few drops being passed, and catherization showing none in the bladder. On June 4, 5, and 6 he passed about 3 ounces each day. The gonorrheal discharge was very profuse. His pulse rate was low, never rising above 86 after the operation. There was no indication of infection or septicæmia as a result of the operation. The trouble appeared to be entirely confined to the kidneys. The usual treatment for acute nephritis was adopted, but without result, and the patient died on the morning of June 6, seven days after the operation.

An autopsy was made by Dr. Lamb, of the Army Medical Museum, and the following conditions were disclosed: Body that of a well-nourished man in the prime of life. The dressings were removed from the operation wounds, and they were found to be united by first intention, without a trace of suppuration or inflammation. The thorax and abdomen were opened. The heart and lungs were normal; the peritoneum was normal, there being no evidence of peritonitis or infection; the liver was normal; the spleen enlarged to twice the normal size, and of dark slate color; both kidneys enlarged, together weighing 18 ounces, multiple cortical hemorrhages and œdema in each; the capsule was adherent in places, and on section of the kidneys they were found to be greatly congested, and presented every appearance of acute hemorrhagic nephritis. The kidneys are now in the Army Medical Museum, No. 11984.

The site of operation was carefully examined. The union of the tissues, as sutured together in Bassini's operation, was found to be firm. It was interesting to note that on the inner surface of the abdomen, to the point where the neck of the sac existed, the high ligation of the sac practiced in operation had entirely obliterated any depres-

sion in the inner surface of the abdomen, showing that the high ligation, as practiced in Bassini's operation, removes the depression in the inner surface of the abdomen at the internal ring, and so does away with this predisposing cause of hernia.

The autopsy confirmed the diagnosis and showed that death was due to acute hemorrhagic nephritis, but the question was left in doubt as to whether the nephritis was due to the gonorrheal infection, to the ether used in anæsthesia, or to irritation of the kidneys by alcoholic excess in which the patient indulged when he was discharged, or to a combination of these factors.

Case 201.—Operation October 10, 1897, for double inguinal hernia; returned to duty February 1, 1898. A small incomplete ventral hernia on right side was reported April 16, 1898. This man, an old soldier, was placed on the retired list May 14, 1899.

Case 210.—Recurrence nearly seven months after operation. In service, wearing a truss.

Case 218.—Recurrence nearly fourteen months after operation. Second operation five days later, on August 28, 1900; no recurrence reported.

Case 231.—Discharged five and one-half months after operation, on certificates of disability for weak abdominal wall, with persistent pain at site of the injury.

Case 234.—A double operation on April 23, 1900; to duty May 28 following. Recurrence on left side July 29, on right side October 16. Discharged December 24, 1900, on certificates of disability for recurrent double hernia and syphilis.

Case 240.—Recurrence six months after operation. A second operation performed; present for duty in the Philippines February 28, 1901, seventeen and one-half months after second operation.

Case 244.—Recurrence three months after operation or one and one-third months after leaving hospital. Discharged on certificates of disability for hernia.

Case 246.—Discharged on certificates of disability five and one-half months after operation for neuralgia of inner side of thigh and scar following operation.

Case 252.—Operation May 9, 1899; duty June 12, 1899; recurrence in two months. Truss worn until second operation, February 16, 1901. To duty April 8, 1901.

Case 253.—Recurrence five months after operation or three and one-half months after leaving hospital. Discharged on certificates of disability for hernia.

Case 254.—Discharged on certificates of disability for hernia six and one-half months after operation or four and one-half months after leaving hospital.

Case 267.—Recurrence fifteen months after operation or thirteen months after leaving hospital. A second operation performed October 13, 1900; duty in sixty-three days.

Case 276.—Operation October 7, 1899, continuous treatment in hospital until a second operation was performed January 13, 1900; to duty April 16, 1900. No recurrence reported.

Case 328.—Operation June 20, 1900, at Dagupan, P. I. Continuous treatment until a second operation was performed, also at Dagupan, August 20, 1900. A third operation was performed at the First Reserve Hospital, Manila, P. I., January 18, 1901. "Remaining without recurrence on the hospital ship *Relief*, May 31, 1901."

In this tabulation of 336 cases the principal operators were Maj. W. P. Kendall, surgeon, United States Army, who reported 58 cases; Maj. W. C. Borden, surgeon, United States Army, 53 cases; Maj. J. M. Banister, surgeon, United States Army, 36 cases; Lieut. Col. A. C. Girard, deputy surgeon-general United States Army, 30 cases, and Col. W. H. Forwood, assistant surgeon-general, United States Army, 26 cases.

Since the tabulation was made the following cases have been operated on or reported:

Name.	Organization.	Age.	Hernia.	Date of operation.	Operator.
W. S. C.	Civilian	26	Left inguinal	Apr. 7, 1901	
G. H.	Corpl., 6 Co., C. Art.	23	Right inguinal	Apr. 23, 1901	
G. R. C.	Pvt., 41 Co., C. Art.	25	do	Apr. 28, 1901	
E. W.	Pvt., Bd., 4th Art.	51	Left inguinal	May 14, 1901	Maj. W. C. Borden, surgeon, U. S. A.
J. J. M.	Civilian	20	Right inguinal	June 4, 1901	
H. A. R.	2d Lt., 8th Cav.	24	do	do	
R. H. L.	Sgt. N. C. S., 26th V. I.	27	do	June 28, 1901	
W. H. J.	1st Sgt. 27th V. I.	23	do	do	
J. G.	Pvt. K, 3d Inf.	29	do	June 10, 1901	First Lieut. P. C. Fauntleroy, assistant surgeon, U. S. A.

Name.	Organization.	Age.	Hernia.	Date of operation.	Operator.
H. T	Q. M. employee		Right inguinal	Mar. 25, 1901	Lieut. Col. A. C. Girard, deputy surgeon-general, U. S. A.
W. G	Pvt., A., 33d V. I		Ventral	Mar. 13, 1901	
J. P	Corpl., L, 36th V. I		Right inguinal	Mar. 14, 1901	
W. H. C	Pvt., B, 26th V. I		do	Apr. 30, 1901	
P. R. B. C	Pvt., B, 28th V. I		do	Apr. 23, 1901	
E. F	Pvt., I, 4th Cav		do	Apr. 16, 1901	
J. B., jr	Civilian	5	do	May 27, 1901	
E. S	Tpt. Bd., 3d Art		Left inguinal	May 25, 1901	
G. M. S	Pvt., B, Engrs		Right inguinal	May 1, 1901	
C. W. C. N	Civilian	40	do	Apr. 30, 1899	Maj. L. A. La Garde, surgeon, U. S. A.
C. McL.[1]	Late Pvt. B, 5th Inf	31	do	June 22, 1899	
J. H. G	Late Co. M, 3d Art	48	do	Nov. 21, 1899	
R. S	Late Co. G, 16th Inf	58	do	Sept. 22, 1900	
M. W	Late Co. F, 2d Inf	42	Left inguinal	Dec. 18, 1900	
F. A. T	Late Hospl. Corps	34	Right inguinal	Dec. 15, 1900	
W. E. T	do	27	do	Mar. 22, 1901	
F. C. P	Pvt. F, 2d Cav	25	Left inguinal	June 20, 1901	First. Lieut. J. Hamilton Stone, assistant surgeon, U. S. A.
R. M	Pvt., B, 14th Cav	21	Right inguinal	May 8, 1901	Maj. Charles E. Woodruff, surgeon, U. S. A.
E. K. W	Corpl., A, 14th Cav	22	do	May 15, 1901	
H. S.[2]	Corpl., H, 3d Art	37	do	May 31, 1899	Col. W. H. Forwood assistant surgeon general, U. S. A.
M. McC.[2]	Female civilian			Oct. 25, 1899	
W. S.[2]	Pvt., 1st Mont. Vols		Right inguinal	May 31, 1899	
R. B	Pvt., B, 6th Cav	23	Left inguinal	Feb. 9, 1900 and June 26, 1900.	Maj. Charles Richard, surgeon, U. S. A.
I. C. C	Hospl. steward	44	Double inguinal	Nov. 8, 1900	
W. A	Corpl., L, 1st Inf	22		Apr. 11, 1901	
J. A	Pvt., M, 1st Inf	38	Right inguinal	June 18, 1901	
J. L	Pvt., C, 8th Cav	19	do	June 26, 1901	

[1] Reenlisted.
[2] No special report on file in this office covering these cases.

STERILIZATION OF ANIMAL LIGATURES AND OF SEA SPONGE.

In connection with these operations for hernia and other surgical proceedings, Col. W. H. Forwood, assistant surgeon-general, United States Army, has submitted his methods for the sterilization of animal ligatures and of sea sponge, as follows:

Sterilization of animal ligatures, catgut, kangaroo tendon, etc.—Use large, long test tubes, say 10 inches by 1 inch, with pure rubber plugs and glass spools. Thoroughly clean and boil spools, tubes, and plugs. Wind catgut ligature on glass spools, make the kangaroo tendon into oval coils and place them in the tubes according to size and kind. Immerse in ether fortior, U. S. P., forty-eight hours, and then wash in ether. Immerse in alcohol with $\frac{1}{1000}$ bichloride of mercury (C. P.); boil twenty minutes in a water or sand bath with the plugs out; remove the tubes while boiling and plug immediately (so as to form a vacuum and remove air from ligatures); and then set aside twenty-four hours. Renew alcohol with $\frac{1}{1000}$ bichloride, and add 1 per cent of tricresol and store away ready for use. (If there be no sediment this renewal of alcohol will be superfluous.) The ligature should be kept at least three days, but it may remain any length of time in this solution before use.

On using, flame the tube, draw out the spools or coils with sterile forceps and place them in a sterile (boiled) ligature dish, with the fluid from the tube, or in common alcohol with $\frac{1}{1000}$ bichloride.

Ten years' experience shows that this method increases the tensile strength of the ligature and renders it absolutely sterile.

Sterilization of sea sponge.—Ordinary commercial formalin affords a convenient means for the complete sterilization of sea sponge. After the sponges have been freed from foreign matter, washed and dried in the usual way, they are to be placed in a wide-mouthed glass jar with a well ground glass stopper and a small quantity of the formalin solution poured over them sufficient to moisten them thoroughly. A portion of the fluid settles in a layer at the bottom while the formaldehyde gas and watery vapor fills the upper part of the jar and penetrates every fiber of the sponge. There they may be kept in store for months or even years without injury. After two or three days they are ready for use. When wanted the sponge is removed from the jar with forceps to avoid injury of the hand, and well rinsed in warm, not hot, sterile water to remove all the formalin which is injurious to the tissues. They should then be placed in warm normal salt solution for use. Experiments begun in

STERILIZATION OF ANIMAL LIGATURES.

1892 with dirty sponges from the deadhouse and kitchen at the Barnes Hospita Washington, D. C., proved the effectiveness of this method. The usual laboratory tests showed even with these sponges, no living organism after forty-eight hours in formalin solution of 40 per cent formaldehyde. Six years' constant use of sponges prepared in this way has given perfect results without a single case of infection from that source.

GUNSHOT INJURIES.

On December 31, 1899, as stated in my last annual report, there remained under treatment 216 cases of gunshot injury, but at the date of that report, October 17, 1900, only 15 of these continued on the sick reports. None of these cases terminated fatally; 3 were returned to duty, one of which was a fracture of the middle third of the femur, and 12 were discharged from the service on account of disability, as shown in the following tabulations:

Gunshot-wound cases remaining in hospital at date of last annual report, showing dispositions.

REGULARS AND VOLUNTEERS.

Character and location of wound.	Remaining at last report.	Disposition in 1900.	
		Duty.	Certificates of disability.
Head, fracture	1	.....	1
Thorax:			
Nonpenetrating	2	1	1
Penetrating	1	.....	1
Abdomen, penetrating	1	.....	1
Thigh:			
Flesh	4	1	3
Fracture middle third	1	1	.....
Fracture lower third	1	.....	1
Foot, flesh	3	.....	3
Tarsus and metatarsus fracture	1	.....	1
Total	15	3	12

REGULARS.

Thorax:			
Nonpenetrating	1	1	.....
Penetrating	1	.....	1
Thigh:			
Flesh	3	1	2
Fracture lower third	1	.....	1
Foot, flesh	2	.....	2
Tarsus and metatarsus fracture	1	.....	1
Total	9	2	7

VOLUNTEERS.

Head, fracture	1	.....	1
Thorax, nonpenetrating	1	.....	1
Abdomen, penetrating	1	.....	1
Thigh:			
Flesh	1	.....	1
Fracture middle third	1	1	.....
Foot, flesh	1	.....	1
Total	6	1	5

During the calendar year 1900, 377 men were killed by gunshot—305 in action and 21 by accident; 30 of the deaths were suicidal and 21 homicidal, as shown in the following tables:

Killed by gunshot.

REGULAR AND VOLUNTEER ARMIES, 1900.

Character and location of wounds.	How received.					Nature of missile.												
		Not in action.				In action.									Not in action.			
	In action.	Accidental.	Suicide.	Homicide.	Total.	Mauser.	Remington.	Remington, dum-dum.	Krag-Jörgensen.	Krag-Jörgensen, dum-dum.	Bullets, not stated.	Shrapnel.	Slugs.	Shell.	Revolver.	Krag-Jörgensen.	Revolver.	Bullets not stated.	Shell.
Head, fracture	78	5	22	4	109	26	21	1	1	....	27	1	1	....	....	7	16	8	....
Face, fracture	2	1	....	....	[1]3	1	....	....	....	....	1	....	....	....	....	1	....	....	....
Neck	18	2	....	1	21	7	4	....	....	....	6	....	....	1	....	1	....	2	....
Thorax, penetrating	101	9	5	13	128	28	28	....	3	....	39	1	1	....	1	4	15	8	....
Abdomen, penetrating	52	3	2	....	57	19	10	....	2	1	19	....	....	1	....	2	1	2	....
Clavicle or scapula, fracture	1	....	....	....	[2]1	....	1	....	....	....	....	....	....	....	....	....	....	....	....
Arm, fracture	1	....	....	....	[3]1	....	1	....	....	....	....	....	....	....	....	....	....	....	....
Thigh, flesh	3	....	....	....	[4]3	....	3	....	....	....	....	....	....	....	....	....	....	....	....
Leg, fracture	1	....	....	....	[5]1	....	....	....	....	....	1	....	....	....	....	....	....	....	....
Unknown	48	1	1	3	53	3	....	....	....	....	45	....	....	....	....	....	....	4	1
Total	305	21	30	21	377	84	68	1	6	1	138	2	2	2	1	15	32	24	1

[1] Fracture of jaw and severing tongue from floor of mouth in one case, facial artery severed in another, hemorrhage post jugular vein in the other.
[2] Hemorrhage subclavian artery.
[3] Severing brachial artery.
[4] Femoral hemorrhage mentioned in one case.
[5] Shock.

REGULARS, 1900.

Character and location of wound.	How received.					Nature of missile.												
		Not in action.				In action.									Not in action.			
	In action.	Accidental.	Suicide.	Homicide.	Total.	Mauser.	Remington.	Remington, dum-dum.	Krag-Jörgensen.	Krag-Jörgensen, dum-dum.	Bullets, not stated.	Shrapnel.	Slugs.	Shell.	Krag-Jörgensen.	Revolver.	Bullets, not stated.	Shell.
Head, fracture	38	2	17	2	59	10	6	1	....	....	19	1	1	....	3	13	5	....
Face, fracture	1	....	....	....	[1]1	....	....	....	....	....	1	....	....	....	....	....	....	....
Neck	12	1	....	1	14	4	3	....	....	....	4	....	....	1	1	....	1	....
Thorax, penetrating	43	6	3	8	60	11	12	....	3	....	15	1	1	....	2	10	5	....
Abdomen, penetrating	24	....	1	....	25	8	3	....	....	1	11	....	....	1	1	....	....	....
Clavicle or scapula, fracture	1	....	....	....	[2]1	....	1	....	....	....	....	....	....	....	....	....	....	....
Arm, fracture	1	....	....	....	[3]1	....	1	....	....	....	....	....	....	....	....	....	....	....
Leg, fracture	1	....	....	....	[4]1	....	....	....	....	....	1	....	....	....	....	....	....	....
Unknown	8	1	1	1	11	....	....	....	....	....	8	....	....	....	....	....	2	1
Total	129	10	22	12	173	33	26	1	3	1	59	2	2	2	7	23	13	1

[1] Fracture of jaw and severing tongue from floor of mouth.
[2] Hemorrhage subclavian artery.
[3] Severing brachial artery.
[4] Shock.

Killed by gunshot—Continued.

VOLUNTEERS, 1900

Character and location of wound.	How received.					Nature of missile.							
		Not in action.				In action.					Not in action.		
	In action.	Accidental.	Suicide.	Homicide.	Total.	Mauser.	Remington.	Krag-Jörgensen.	Revolver.	Bullets, not stated.	Krag-Jörgensen.	Revolver.	Bullets, not stated.
Head, fracture	40	3	5	2	50	16	15	1	.....	8	1	3	3
Face, fracture	[1]1	[2]1	.....	.....	2	1	.....	.....	.....	.....	1	.....	.....
Neck	6	1	.....	.....	7	3	1	.....	.....	2	.....	.....	1
Thorax, penetrating	58	3	2	5	68	17	16	.....	1	24	2	5	3
Abdomen, penetrating	28	3	1	.....	32	11	7	2	.....	8	1	1	2
Thigh, flesh	[3]3	.....	.....	.....	3	.....	3	.....	.....	.....	.....	.....	.....
Unknown	40	.....	.....	2	42	3	.....	.....	.....	37	.....	.....	2
Total	176	11	8	9	204	51	42	3	1	79	8	9	11

[1] Severed facial artery.
[2] Hemorrhage post jugular vein.
[3] Femoral hemorrhage mentioned in one case.

Besides the 377 killed by gunshot, 1,173 cases were received in the hospital for treatment; 782 were incurred in action, 315 not in action but in line of duty, 57 not in line of duty, while 12 were suicidal and 7 homicidal.

Ninety-two of the 1,173 cases proved fatal, 70 of which were battle wounds, 12 received in line of duty, 3 not in line of duty, 4 were suicidal, and 3 homicidal.

Of the total number struck by gunshot missiles, 469, or 30.3 per cent, died from the injuries inflicted. The killed constituted 24.3 per cent of those struck and the wounded 75.7. One man was killed for every 3.1 men wounded. This is a much heavier death record than was given by the gunshot wounds of 1898 and 1899. During those years the killed constituted 11.9 per cent of those struck, the wounded 88.1 per cent, or 1 man killed for 7.4 wounded. The nature of the missile is not stated in 33 per cent of the cases; the Mauser bullet is noted in 23 per cent, the Remington in 16 per cent, the Krag-Jörgensen in 11 per cent, and the revolver in as high as 8 per cent of the total.

The following tabulations give the statistical data of—

All gunshot wounds:
- Regulars and Volunteers.
- Regulars.
- Volunteers.

Gunshot wounds received in action:
- Regulars and Volunteers.
- Regulars.
- Volunteers.

Gunshot wounds other than battle wounds:
- Regulars and Volunteers.
- Regulars.
- Volunteers.

All gunshot wounds.

REGULAR AND VOLUNTEER ARMIES, 1900.

Character and location of wounds.	How received.						Nature of missile.								
	In action.	Not in action.				Total.	Mauser.	Remington.	Krag-Jörgensen.	Winchester.	Mannlicher.	Bullet, brass.	Bullets, not stated.	Revolver.	Small shot.
		In line of duty.	Not in line of duty.	Suicidal.	Homicidal.										
Head:															
Flesh	22	2	3	3	1	31	10	2	5	...	...	...	10	2	...
Fracture	15	5	....	1	1	22	5	3	3	...	...	...	5	3	...
Face:															
Flesh	13	5	....	....	....	18	2	2	1	...	...	...	7	....	...
Fracture	8	3	2	....	....	13	3	1	1	...	...	...	3	4	...
Neck	18	4	1	....	....	23	9	1	4	...	...	...	6	2	...
Spine, fracture	13	....	....	....	....	13	4	2	....	...	...	...	6	....	...
Thorax:															
Nonpenetrating	29	7	1	1	...	38	12	7	2	2	...	...	9	3	...
Penetrating	45	5	4	7	2	63	20	13	4	...	...	...	17	9	...
Abdomen:															
Nonpenetrating	9	8	....	....	....	17	4	1	2	...	...	...	7	2	...
Penetrating	27	5	2	...	1	35	9	6	3	...	...	...	14	2	...
Pelvis, fracture	4	....	....	....	....	4	1	1	....	...	...	...	1	....	...
Back and hip, flesh	39	13	2	....	....	54	16	10	7	...	...	...	13	5	1
Perineum, genital and urinary organs	2	2	1	...	...	5	1	1	2	...	...	...	....	1	...
Shoulder:															
Flesh	26	10	3	....	....	39	9	4	3	...	...	...	19	3	...
Fracture clavicle or scapula	5	....	....	....	....	5	2	1	....	...	...	...	1	....	...
Joint	5	....	1	....	1	7	....	2	1	...	...	...	3	....	...
Arm:															
Flesh	58	6	4	....	....	68	25	11	6	...	...	...	20	4	...
Fracture	19	1	....	....	....	20	7	6	3	...	...	...	2	....	...
Elbow joint	16	3	....	....	....	19	4	2	2	...	...	...	8	....	...
Forearm:															
Flesh	30	12	2	....	....	44	10	2	5	...	...	1	12	8	2
Fracture	16	5	2	....	....	23	5	5	5	...	...	...	4	2	...
Wrist joint	3	1	....	....	....	4	....	1	....	...	...	...	2	....	...
Hand, flesh	28	38	4	....	....	70	12	3	10	...	...	...	27	13	...
Carpus and metacarpus, fracture	12	15	4	....	....	31	4	4	11	...	...	...	8	3	...
Fingers, fracture	3	42	4	....	....	49	1	1	19	...	...	...	20	5	1
Hip joint	2	....	....	....	....	2	1	....	....	...	...	...	....	....	...
Thigh:															
Flesh	128	28	8	....	1	165	37	40	11	...	...	...	47	16	2
Fracture, upper third	15	1	....	....	....	16	3	4	2	...	...	...	7	....	...
Fracture, middle third	5	2	....	....	....	7	2	1	2	...	...	...	2	....	...
Fracture, lower third	12	2	....	....	....	14	6	5	....	...	...	...	2	1	...
Kneejoint	15	4	1	....	....	20	6	1	1	...	...	...	5	3	1
Leg:															
Flesh	67	26	1	....	....	94	21	16	7	...	...	...	25	20	...
Fracture	28	16	1	....	....	45	6	8	7	...	2	...	10	8	...
Ankle joint	5	2	1	....	....	8	....	2	3	...	...	...	3	....	...
Foot, flesh	19	22	3	....	....	44	5	4	15	...	...	...	17	2	1
Tarsus and metatarsus, fracture	19	13	1	....	....	33	6	4	9	...	...	...	8	4	...
Toes, fracture	1	7	1	....	....	9	....	....	5	...	...	...	2	2	...
Unknown	1	....	....	....	....	1	....	....	....	...	...	...	1	....	...
Total	782	315	57	12	7	1,173	268	177	161	2	2	1	353	127	8

[1] Remaining in hospital May 31, 1901.
[2] Remaining in hospital April 30, 1901.
[3] Remaining in hospital June 30, 1901.
[4] Remaining in hospital April 30, 1901, and June 30, 1901.

All gunshot wounds.

REGULAR AND VOLUNTEER ARMIES, 1900.

Nature of missile.													Disposition.									
Gravel propelled by striking bullets.	Brass cover of bullet.	Percussion cap for dynamite shell.	Explosion of dynamite primer.	Explosion of gun.	Explosion of cartridge.	Fragment exploded bullet.	Explosion of powder.	Slugs.	Iron slug from cannon.	Shell.	Shrapnel.	One-pounder.	Total.	Duty.	Certificates of disability.	Died.	Discharged by order.	Expiration of service and mustered out.	Missing in action.	Deserted.	Death, other causes.	Remaining last report.	Total.
....	....	....	....	....	....	....	....	....	....	2	....	....	31	30	....	1	....	....	....	....	....	....	31
....	....	....	....	....	....	1	....	....	....	2	....	....	22	1	10	10	....	....	....	....	....	[1]1	22
1	....	....	....	....	3	....	1	1	....	....	....	....	18	15	2	....	....	....	....	....	1	....	18
....	....	....	....	....	....	....	....	....	....	1	....	....	13	7	3	....	1	1	....	....	....	[2]1	13
....	....	....	....	....	....	....	....	....	....	1	....	....	23	17	4	1	1	....	....	....	....	....	23
....	....	....	....	....	....	....	....	....	....	....	1	....	13	....	4	9	....	....	....	....	....	....	13
....	....	....	....	....	....	....	....	....	....	3	....	....	38	37	....	....	....	....	....	....	1	....	38
....	....	....	....	....	....	....	....	....	....	....	....	....	63	28	17	16	....	1	....	....	....	[3]1	63
....	....	....	....	....	1	....	....	....	....	....	....	....	17	16	1	....	....	....	....	....	....	....	17
....	....	....	....	....	....	....	....	....	....	....	1	....	35	5	2	28	....	....	....	....	....	....	35
....	....	....	....	....	....	....	....	1	....	....	....	....	4	1	2	....	....	1	....	....	....	....	4
....	....	....	....	....	....	....	....	....	1	1	....	....	54	49	1	1	....	1	....	....	....	[4]2	54
....	....	....	....	....	....	....	....	....	....	....	....	....	5	5	....	....	....	....	....	....	....	....	5
....	....	....	....	....	....	....	....	....	....	....	1	....	39	31	6	....	1	1	....	....	....	....	39
....	1	....	....	....	....	....	....	....	....	....	....	....	5	4	1	....	....	....	....	....	....	....	5
....	....	....	....	....	....	....	....	....	....	1	....	....	7	....	6	1	....	....	....	....	....	....	7
....	....	....	....	....	....	....	....	....	....	2	....	....	68	55	9	2	1	....	....	....	....	[5]1	68
....	....	....	....	....	....	....	....	....	1	1	....	....	20	7	10	1	....	1	....	....	....	[6]1	20
....	....	....	....	....	....	....	....	....	1	1	....	1	19	2	15	1	....	....	....	....	....	[7]1	19
....	....	....	....	....	1	2	....	....	....	....	1	....	44	40	3	....	....	1	....	....	....	....	44
....	....	....	....	....	....	....	....	2	....	....	....	....	23	10	13	....	....	....	....	....	....	....	23
....	....	....	....	....	....	....	....	....	....	....	1	....	4	....	4	....	....	....	....	....	....	....	4
....	1	....	....	1	3	....	....	....	....	....	....	....	70	67	....	1	1	....	....	....	....	[8]1	70
....	....	....	....	....	....	....	....	....	....	....	1	....	31	15	13	....	....	....	....	....	1	[8]2	31
....	....	1	1	....	....	....	....	....	....	....	....	....	49	36	9	....	....	1	....	2	....	1	49
....	[6]1	....	....	....	....	....	....	....	....	....	....	....	2	....	1	[7]1	....	....	....	....	....	....	2
....	1	....	....	....	1	2	....	....	1	1	6	....	165	143	13	4	2	2	1	....	....	....	165
....	....	....	....	....	....	....	....	....	....	....	....	....	16	4	6	[7]3	1	....	....	....	....	[8]2	16
....	....	....	....	....	....	....	....	....	....	....	....	....	7	....	3	2	....	....	....	....	1	[8]1	7
....	....	....	....	....	....	....	....	....	....	....	....	....	14	1	10	2	....	....	....	....	....	[8]1	14
....	....	....	....	....	....	....	....	....	....	....	3	....	20	4	9	3	1	....	....	1	1	[8]1	20
....	....	....	....	....	....	....	....	....	....	1	4	....	94	82	7	....	2	2	....	....	....	[8]1	94
....	....	....	....	....	....	....	....	....	....	2	2	....	45	16	21	1	1	1	....	....	....	[8]5	45
....	....	....	....	....	....	....	....	....	....	....	....	....	8	....	5	2	....	....	....	....	....	[8]1	8
....	....	....	....	....	....	....	....	....	....	....	....	....	44	40	1	....	....	2	....	....	....	[8]1	44
....	....	....	....	....	1	....	....	....	....	1	....	....	33	15	12	1	2	2	....	....	1	....	33
....	....	....	....	....	....	....	....	....	....	....	....	....	9	8	1	....	....	....	....	....	....	....	9
....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	1	....	....	....	....	....	....	1
1	4	1	1	1	10	5	1	4	4	20	21	1	1,173	791	224	92	14	17	1	3	6	25	1,173

[5] Remaining in hospital July 31, 1901.
[6] Remington bullet and detached brass jacket.
[7] 1 death in 1901.
[8] 2 remaining in hospital May 31, 1901, and 3 June 30, 1901.

All gunshot wounds—Continued.

REGULAR ARMY, 1900.

Character and location of wounds.	How received.						Nature of missile.								
		Not in action.													
	In action.	In line of duty.	Not in line of duty.	Suicidal.	Homicidal.	Total.	Mauser.	Remington.	Krag-Jörgensen.	Winchester.	Mannlicher.	Bullet, brass.	Bullets, not stated.	Revolver.	Small shot.
Head:															
Flesh	13	2	2	3	1	21	4	2	3	...	...	...	8	2	...
Fracture	9	4	....	1	1	15	2	1	3	...	...	...	5	2	...
Face:															
Flesh	3	3	....	...	...	6	....	1	....	...	...	...	2	....	...
Fracture	3	2	2	...	...	7	....	....	1	...	...	...	2	3	...
Neck	7	2	1	...	...	10	2	....	1	...	...	...	4	2	...
Spine, fracture	6	....	....	...	...	6	....	....	....	...	...	...	5	....	...
Thorax:															
Nonpenetrating	9	5	1	1	...	16	5	....	1	...	...	...	4	3	...
Penetrating	20	3	3	6	2	34	6	4	3	...	...	...	14	7	...
Abdomen:															
Nonpenetrating	2	5	....	...	...	7	....	....	1	...	...	...	4	2	...
Penetrating	14	2	2	...	1	19	4	1	1	...	...	...	10	2	...
Pelvis, fracture	1	....	....	...	...	1	....	....	....	...	...	...	1	....	...
Back and hip, flesh	15	8	2	...	...	25	4	4	5	...	...	...	7	3	...
Perineum, genital and urinary organs	....	1	....	...	...	1	....	....	1	...	...	...	....	....	...
Shoulder:															
Flesh	14	3	3	...	...	20	3	2	1	...	...	...	12	1	...
Fracture clavicle or scapula	1	....	....	...	...	1	....	....	....	...	...	...	1	....	...
Joint	5	....	....	...	1	6	....	2	1	...	...	...	2	....	...
Arm:															
Flesh	23	4	2	...	...	29	7	3	3	...	...	...	12	2	...
Fracture	6	....	....	...	...	6	3	1	....	...	...	...	1	....	...
Elbow joint	10	1	....	...	...	11	1	1	....	...	...	...	7	....	...
Forearm:															
Flesh	12	7	2	...	...	21	3	....	....	...	...	...	8	5	2
Fracture	7	1	1	...	...	9	2	2	1	...	...	...	2	1	...
Wrist joint	3	....	....	...	...	3	....	1	....	...	...	...	1	....	...
Hand, flesh	11	18	3	...	...	32	3	2	4	...	...	...	13	5	...
Carpus and metacarpus, fracture	8	8	2	...	...	18	3	2	6	...	...	...	3	3	...
Fingers, fracture	1	19	3	...	...	23	....	1	5	...	...	...	11	3	1
Hip joint	2	....	....	...	...	2	1	....	....	...	...	...	....	....	...
Thigh:															
Flesh	50	19	8	...	1	78	10	13	5	...	...	...	30	11	1
Fracture upper third	5	1	....	...	...	6	1	2	1	...	...	...	2	....	...
Fracture middle third	4	1	....	...	...	5	2	1	1	...	...	...	1	....	...
Fracture lower third	1	2	....	...	...	3	....	1	....	...	...	...	1	1	...
Kneejoint	8	2	1	...	...	11	1	1	....	...	...	...	4	2	...
Leg:															
Flesh	32	12	....	...	...	44	6	5	1	...	...	...	18	9	...
Fracture	17	9	1	...	...	27	2	2	4	...	2	...	7	6	...
Ankle joints	4	1	1	...	...	6	....	1	2	...	...	...	3	....	...
Foot, flesh	9	5	....	...	...	14	....	2	2	...	...	...	8	1	1
Tarsus and metatarsus fracture	10	8	....	...	...	18	2	1	2	...	...	...	7	4	...
Toes, fracture	....	1	1	...	...	2	....	....	....	...	...	...	1	1	...
Unknown	1	....	....	...	...	1	....	....	....	...	...	...	1	....	...
Total	346	159	41	11	7	564	77	59	59	...	2	...	222	82	5

[1] Remaining in hospital May 31, 1901.
[2] Remaining in hospital April 30, 1901.
[3] Remaining in hospital June 30, 1901.
[4] Remaining in hospital April 30, 1901, and June 30, 1901.

All gunshot wounds—Continued.

REGULAR ARMY, 1900.

Nature of missile.													Disposition.									
Gravel propelled by striking bullets.	Brass cover of bullet.	Percussion cap for dynamite shell.	Explosion of dynamite primer.	Explosion of gun.	Explosion of cartridge.	Fragment exploded bullet.	Explosion of powder.	Slugs.	Iron slug from cannon.	Shell.	Shrapnel.	One-pounder.	Total.	Duty.	Certificates of disability.	Died.	Discharged by order.	Expiration of service and muster out.	Missing in action.	Deserted.	Death, other causes.	Remaining last report.	Total.
....	....	....	....	....	....	....	....	....	....	2	....	....	21	20	....	1	....	....	....	....	....	....	12
....	....	....	....	....	....	....	....	....	....	2	....	....	15	....	7	7	....	....	....	....	....	[1] 1	15
....	....	....	....	....	2	....	1	....	....	....	....	....	6	5	....	....	....	....	....	....	1	....	6
....	....	....	....	....	....	....	....	....	....	1	....	....	7	4	1	....	1	....	....	....	....	[2] 1	7
....	....	....	....	....	....	....	....	....	....	1	....	....	10	7	3	....	....	....	....	....	....	....	10
....	....	....	....	....	....	....	....	....	....	....	1	....	6	....	2	4	....	....	....	....	....	....	6
....	....	....	....	....	....	....	....	....	....	3	....	....	16	15	....	....	....	....	....	....	1	....	16
....	....	....	....	....	....	....	....	....	....	....	....	....	34	15	12	6	....	....	....	....	....	[3] 1	34
....	....	....	....	....	....	....	....	....	....	....	....	....	7	7	....	....	....	....	....	....	....	....	7
....	....	....	....	....	....	....	....	....	....	....	1	....	19	3	2	14	....	....	....	....	....	....	19
....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	....	....	....	....	....	....	....	1
....	....	....	....	....	....	....	....	....	1	1	....	....	25	22	1	....	....	....	....	....	....	[4] 2	25
....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	....	....	....	....	....	....	....	....	1
....	....	....	....	....	....	....	....	....	....	....	1	....	20	16	4	....	....	....	....	....	....	....	20
....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	....	....	....	....	....	....	....	....	1
....	....	....	....	....	....	....	....	....	....	1	....	....	6	....	5	1	....	....	....	....	....	....	6
....	....	....	....	....	....	....	....	....	....	2	....	....	29	24	4	....	....	....	....	....	....	[5] 1	29
....	....	....	....	....	....	....	....	....	....	1	....	....	6	2	3	....	....	....	....	....	....	[1] 1	6
....	....	....	....	....	....	....	....	....	....	1	....	1	11	....	10	....	....	....	....	....	....	[2] 1	11
....	....	....	....	....	1	1	....	....	....	....	1	....	21	18	3	....	....	....	....	....	....	....	21
....	....	....	....	....	....	....	1	....	....	....	....	....	9	4	5	....	....	....	....	....	....	....	9
....	....	....	....	....	....	....	....	....	....	....	1	....	3	....	3	....	....	....	....	....	....	....	3
....	....	....	....	1	3	....	....	....	....	....	....	....	32	31	....	....	....	....	....	....	....	[1] 1	32
....	....	....	....	....	....	....	....	....	....	....	1	....	18	7	9	....	....	....	....	....	....	[1] 2	18
....	....	1	1	....	....	....	....	....	....	....	....	....	23	17	4	....	....	....	....	1	....	[1] 1	23
....	[6] 1	....	....	....	....	....	....	....	....	....	....	....	2	....	1	[6] 1	....	....	....	....	....	....	2
....	....	....	....	....	1	....	....	....	....	1	6	....	78	68	9	1	....	....	....	....	....	....	78
....	....	....	....	....	....	....	....	....	....	....	....	....	6	2	1	[7] 1	....	....	....	....	....	[3] 2	6
....	....	....	....	....	....	....	....	....	....	....	....	....	5	....	2	2	....	....	....	....	....	[1] 1	5
....	....	....	....	....	....	....	....	....	....	....	....	....	3	....	1	1	....	....	....	....	....	[1] 1	3
....	....	....	....	....	....	....	....	....	....	....	3	....	11	1	6	2	....	....	....	1	....	[3] 1	11
....	....	....	....	....	....	....	....	....	....	1	4	....	44	41	2	....	....	....	....	....	....	[1] 1	44
....	....	....	....	....	....	....	....	....	....	2	2	....	27	10	12	....	....	....	....	....	....	[8] 5	27
....	....	....	....	....	....	....	....	....	....	....	....	....	6	....	4	1	....	....	....	....	....	[1] 1	6
....	....	....	....	....	....	....	....	....	....	....	....	....	14	11	....	....	....	2	....	....	....	[2] 1	14
....	....	....	....	....	1	....	....	....	....	1	....	....	18	10	7	1	....	....	....	....	....	....	18
....	....	....	....	....	....	....	....	....	....	....	....	....	2	1	1	....	....	....	....	....	....	....	2
....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	1	....	....	....	....	....	....	1
....	1	1	1	1	8	1	1	1	1	20	21	1	564	363	125	44	1	2	....	2	2	25	564

[5] Remaining in hospital July 31, 1901.
[6] Remington bullet and detached brass jacket.
[7] Died in 1901.
[8] 2 remaining in hospital May 31, 1901, and 3 remaining June 30, 1901.

All gunshot wounds—Continued.

VOLUNTEER ARMY, 1900.

Character and location of wounds.	How received.						Nature of missile.							
		Not in action.												
	In action.	In line of duty.	Not in line of duty.	Suicidal.	Homicidal.	Total.	Mauser.	Remington.	Krag-Jörgensen.	Winchester.	Mannlicher.	Bullet, brass.	Bullets, not stated.	Revolver.	Small shot.
Head:															
Flesh	9	....	1	....	....	10	6	....	2	....	....	....	2	....	....
Fracture	6	1	....	....	....	7	3	2	....	....	....	....	....	1	....
Face:															
Flesh	10	2	....	....	....	12	2	1	1	....	....	....	5	....	....
Fracture	5	1	....	....	....	6	3	1	....	....	....	....	1	1	....
Neck	11	2	....	....	....	13	7	1	3	....	....	....	2	....	....
Spine, fracture	7	....	....	....	....	7	4	2	....	....	....	....	1	....	....
Thorax:															
Nonpenetrating	20	2	....	....	....	22	7	7	1	2	....	....	5	....	....
Penetrating	25	2	1	1	....	29	14	9	1	....	....	....	3	2	....
Abdomen:															
Nonpenetrating	7	3	....	....	....	10	4	1	1	....	....	....	3	....	....
Penetrating	13	3	....	....	....	16	5	5	2	....	....	....	4	....	....
Pelvis, fracture	3	....	....	....	....	3	1	1	....	....	....	....	....	....	....
Back and hip, flesh	24	5	....	....	....	29	12	6	2	....	....	....	6	2	1
Perineum, genital and urinary organs	2	1	1	....	....	4	1	1	1	....	....	....	....	1	....
Shoulder:															
Flesh	12	7	....	....	....	19	6	2	2	....	....	....	7	2	....
Fracture clavicle or scapula	4	....	....	....	....	4	2	1	....	....	....	....	....	....	....
Joint	....	....	1	....	....	1	....	....	....	....	....	....	1	....	....
Arm:															
Flesh	35	2	2	....	....	39	18	8	3	....	....	....	8	2	....
Fracture	13	1	....	....	....	14	4	5	3	....	....	....	1	....	....
Elbow joint	6	2	....	....	....	8	3	1	2	....	....	....	1	....	....
Forearm:															
Flesh	18	5	....	....	....	23	7	2	5	....	....	1	4	3	....
Fracture	9	4	1	....	....	14	3	3	4	....	....	....	2	1	....
Wrist joint	....	1	....	....	....	1	....	....	....	....	....	....	1	....	....
Hand, flesh	17	20	1	....	....	38	9	1	6	....	....	....	14	7	....
Carpus and metacarpus, fracture	4	7	2	....	....	13	1	2	5	....	....	....	5	....	....
Fingers, fracture	2	23	1	....	....	26	1	....	14	....	....	....	9	2	....
Thigh:															
Flesh	78	9	....	....	....	87	27	27	6	....	....	....	17	5	1
Fracture upper third	10	....	....	....	....	10	2	2	1	....	....	....	5	....	....
Fracture middle third	1	1	....	....	....	2	....	....	1	....	....	....	1	....	....
Fracture lower third	11	....	....	....	....	11	6	4	....	....	....	....	1	....	....
Kneejoint	7	2	....	....	....	9	5	....	1	....	....	....	1	1	1
Leg:															
Flesh	35	14	1	....	....	50	15	11	6	....	....	....	7	11	....
Fracture	11	7	....	....	....	18	4	6	3	....	....	....	3	2	....
Ankle joint	1	1	....	....	....	2	....	1	1	....	....	....	....	....	....
Foot, flesh	10	17	3	....	....	30	5	2	13	....	....	....	9	1	....
Tarsus and metatarsus, fracture	9	5	1	....	....	15	4	3	7	....	....	....	1	....	....
Toes, fracture	1	6	....	....	....	7	....	....	5	....	....	....	1	1	....
Total	436	156	16	1	....	609	191	118	102	2	....	1	131	45	3

All gunshot wounds—Continued.

VOLUNTEER ARMY, 1900.

Nature of missile.													Disposition.								
Gravel propelled by striking bullets.	Brass cover of bullet.	Percussion cap for dynamite shell.	Explosion of dynamite primer.	Explosion of gun.	Explosion of cartridge.	Fragment exploded bullet.	Explosion of powder.	Slugs.	Iron slug from cannon.	Shell.	Shrapnel.	One-pounder.	Total.	Duty.	Certificates of disability.	Died.	Discharged by order.	Expiration of service and muster out.	Missing in action.	Deserted.	Death, other causes.	Remaining last report.	Total.
													10	10									10
						1							7	1	3	3							7
1					1			1					12	10	2								12
													6	3	2			1					6
													13	10	1	1	1						13
													7		2	5							7
													22	22									22
													29	13	5	10		1					29
					1								10	9	1								10
													16	2		14							16
								1					3	1	1			1					3
													29	27		1		1					29
													4	4									4
													19	15	2		1	1					19
	1												4	3	1								4
													1		1								1
													39	31	5	2	1						39
									1				14	5	7	1		1					14
									1				8	2	5	1							8
						1							23	22				1					23
								1					14	6	8								14
													1		1								1
	1												38	36		1	1						38
													13	8	4						1		13
													26	19	5			1		1			26
	1					2			1				87	75	4	3	2	2	1				87
													10	2	5	2	1						10
													2		1						1		2
													11	1	9	1							11
													9	3	3	1	1				1		9
													50	41	5		2	2					50
													18	6	9	1	1	1					18
													2		1	1							2
													30	29	1								30
													15	5	5		2	2			1		15
													7	7									7
1	3				2	4		3	3				609	428	99	48	13	15	1	1	4		609

Gunshot wounds received in action.

REGULAR AND VOLUNTEER ARMIES, 1900.

Character and location of wound.	Nature of missile.									
	Mauser.	Remington.	Krag-Jörgensen.	Winchester.	Mannlicher.	Bullet, brass.	Bullets, not stated.	Revolver.	Small shot.	Gravel propelled by striking bullets.
Head:										
Flesh	10	2	2				6			
Fracture	5	3	1				3			
Face:										
Flesh	2	2					6			1
Fracture	3	1					3			
Neck	9	1	1				6			
Spine, fracture	4	2					6			
Thorax:										
Nonpenetrating	12	7		2			5	1		
Penetrating	20	13	1				11			
Abdomen:										
Nonpenetrating	4	1					4			
Penetrating	9	6					11			
Pelvis, fracture	1	1					1			
Back and hip, flesh	16	10	2				8		1	
Perineum, genital and urinary organs	1	1								
Shoulder:										
Flesh	9	4					12			
Fracture clavicle or scapula	2	1					1			
Joint		2					2			
Arm:										
Flesh	25	11	2				18			
Fracture	7	6	2				2			
Elbow joint	4	2					7			
Forearm:										
Flesh	10	2	4			1	10			
Fracture	5	5					4			
Wrist joint		1					1			
Hand, flesh	11	3					12			
Carpus and metacarpus, fracture	4	4	1				2			
Fingers, fracture	1	1					1			
Hip joint	1									
Thigh:										
Flesh	37	40	3				35	1	1	
Fracture upper third	3	4	1				7			
Fracture middle third	2	1					2			
Fracture lower third	6	5					1			
Knee joint	6	1					4		1	
Leg:										
Flesh	21	16	3				22			
Fracture	6	8			2		8			
Ankle joint		2					3			
Foot, flesh	5	3	1				10			
Tarsus and metatarsus, fracture	6	4	1				7			
Toes, fracture			1							
Unknown							1			
Total	267	176	26	2	2	1	242	2	3	1

[1] Remaining in hospital May 31, 1901.
[2] Remaining in hospital April 30, 1901.
[3] Remaining in hospital April 30, 1901, and June 30, 1901.
[4] Remaining in hospital July 31, 1901.

Gunshot wounds received in action.

REGULAR AND VOLUNTEER ARMIES, 1900.

Nature of missile.										Disposition.								
Brass cover of bullet.	Explosion of gun.	Fragment exploded bullet.	Explosion of powder.	Slugs.	Iron slug from cannon.	Shell.	Shrapnel.	One-pounder.	Total.	Duty.	Certificate of disability.	Died.	Discharged by order.	Expiration of service and muster out.	Missing in action.	Death, other causes.	Remaining last report.	Total.
.....	.....	.....	.....	.....	.....	2	.....	.....	22	21	.....	1	.....	.....	.....	.....	.....	22
.....	.....	1	.....	.....	.....	2	.....	.....	15	1	7	6	.....	.....	.....	.....	[1]1	15
.....	.....	.....	1	1	.....	.....	.....	.....	13	11	1	.....	.....	.....	.....	1	.....	13
.....	.....	.....	.....	.....	.....	1	.....	.....	8	3	3	.....	.....	1	.....	.....	[2]1	8
.....	.....	.....	.....	.....	.....	1	.....	.....	18	12	4	1	1	.....	.....	.....	.....	18
.....	.....	.....	.....	.....	.....	.....	1	.....	13	.....	4	9	.....	.....	.....	.....	.....	13
.....	.....	.....	.....	.....	.....	2	.....	.....	29	29	.....	.....	.....	.....	.....	.....	.....	29
.....	.....	.....	.....	.....	.....	.....	.....	.....	45	20	14	10	.....	1	.....	.....	.....	45
.....	.....	.....	.....	.....	.....	.....	.....	.....	9	8	1	.....	.....	.....	.....	.....	.....	9
.....	.....	.....	.....	.....	.....	.....	1	.....	27	3	2	22	.....	.....	.....	.....	.....	27
.....	.....	.....	.....	1	.....	.....	.....	.....	4	1	2	.....	.....	1	.....	.....	.....	4
.....	.....	.....	.....	.....	1	1	.....	.....	39	35	1	1	.....	.....	.....	.....	[2]2	39
.....	.....	.....	.....	.....	.....	.....	.....	.....	2	2	.....	.....	.....	.....	.....	.....	.....	2
.....	.....	.....	.....	.....	.....	.....	1	.....	26	20	5	.....	.....	1	.....	.....	.....	26
1	.....	.....	.....	.....	.....	.....	.....	.....	5	4	1	.....	.....	.....	.....	.....	.....	5
.....	.....	.....	.....	.....	.....	1	.....	.....	5	.....	4	1	.....	.....	.....	.....	.....	5
.....	.....	.....	.....	.....	.....	2	.....	.....	58	45	9	2	1	.....	.....	.....	[4]1	58
.....	.....	.....	.....	.....	1	1	.....	.....	19	6	10	1	.....	1	.....	.....	[1]1	19
.....	.....	.....	.....	.....	1	1	.....	1	16	1	14	1	.....	.....	.....	.....	.....	16
.....	.....	2	.....	.....	.....	.....	1	.....	30	27	2	.....	.....	1	.....	.....	.....	30
.....	.....	.....	.....	2	.....	.....	.....	.....	16	6	10	.....	.....	.....	.....	.....	.....	16
.....	.....	.....	.....	.....	.....	.....	1	.....	3	.....	3	.....	.....	.....	.....	.....	.....	3
1	1	.....	.....	.....	.....	.....	.....	.....	28	27	.....	.....	1	.....	.....	.....	.....	28
.....	.....	.....	.....	.....	.....	.....	1	.....	12	5	6	.....	.....	.....	.....	.....	[1]1	12
.....	.....	.....	.....	.....	.....	.....	.....	.....	3	1	1	.....	.....	.....	.....	.....	[1]1	3
[5]1	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	1	[5]1	.....	.....	.....	.....	.....	2
1	.....	2	.....	.....	1	1	6	.....	128	107	13	3	2	2	1	.....	.....	128
.....	.....	.....	.....	.....	.....	.....	.....	.....	15	3	6	[6]3	1	.....	.....	.....	[7]2	15
.....	.....	.....	.....	.....	.....	.....	.....	.....	5	.....	2	1	.....	.....	.....	1	[1]1	5
.....	.....	.....	.....	.....	.....	.....	.....	.....	12	1	10	1	.....	.....	.....	.....	.....	12
.....	.....	.....	.....	.....	.....	.....	3	.....	15	4	6	3	1	.....	.....	.....	[7]1	15
.....	.....	.....	.....	.....	.....	1	4	.....	67	59	6	.....	1	1	.....	.....	.....	67
.....	.....	.....	.....	.....	.....	2	2	.....	28	5	18	.....	1	1	.....	.....	[8]3	28
.....	.....	.....	.....	.....	.....	.....	.....	.....	5	.....	4	1	.....	.....	.....	.....	.....	5
.....	.....	.....	.....	.....	.....	.....	.....	.....	19	16	1	.....	.....	2	.....	.....	.....	19
.....	.....	.....	.....	.....	.....	1	.....	.....	19	8	5	1	2	2	.....	1	.....	19
.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1	.....	.....	.....	.....	.....	.....	.....	1
.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	1	.....	.....	.....	.....	.....	1
4	1	5	1	4	4	19	21	1	782	492	176	70	11	14	1	3	15	782

[5] Remington bullet and detached brass jacket.
[6] One death in 1901.
[7] Remaining in hospital June 30, 1901.
[8] One remaining in hospital May 31, 1901, and two remaining June 30, 1901.

Gunshot wounds received in action—Continued.

REGULAR ARMY, 1900.

Character and location of wound.	Nature of missile.									
	Mauser.	Remington.	Krag-Jörgensen.	Winchester.	Mannlicher.	Bullet, brass.	Bullets, not stated.	Revolver.	Small shot.	Gravel, propelled by striking bullets.
Head:										
Flesh	4	2	1				4			
Fracture	2	1	1				3			
Face:										
Flesh		1					1			
Fracture							2			
Neck	2						4			
Spine, fracture							5			
Thorax:										
Nonpenetrating	5						1	1		
Penetrating	6	4					10			
Abdomen:										
Nonpenetrating							2			
Penetrating	4	1					8			
Pelvis, fracture							1			
Back and hip, flesh	4	4	1				4			
Shoulder:										
Flesh	3	2					8			
Fracture clavicle or scapula							1			
Joint		2					2			
Arm:										
Flesh	7	3					11			
Fracture	3	1					1			
Elbow joint	1	1					6			
Forearm:										
Flesh	3						7			
Fracture	2	2					2			
Wrist joint		1					1			
Hand, flesh	3	2					5			
Carpus and metacarpus, fracture	3	2					2			
Fingers, fracture		1								
Hip joint	1									
Thigh:										
Flesh	10	13	1				19			
Fracture upper third	1	2					2			
Fracture middle third	2	1					1			
Fracture lower third		1								
Knee joint	1	1					3			
Leg:										
Flesh	6	5					16			
Fracture	2	2			2		7			
Ankle joint		1					3			
Foot, flesh		2					7			
Tarsus and metatarsus, fracture	2	1					6			
Unknown							1			
Total	77	59	4		2		156	1		

[1] Remaining in hospital May 31, 1901.
[2] Remaining in hospital April 30, 1901.
[3] Remaining in hospital April 30, 1901, and June 30, 1901.
[4] Remaining in hospital July 31, 1901.

Gunshot wounds received in action—Continued.

REGULAR ARMY, 1900.

Nature of missile.										Disposition.								
Brass cover of bullet.	Explosion of gun.	Fragment exploded bullet.	Explosion of powder.	Slugs.	Iron slug from cannon.	Shell.	Shrapnel.	One-pounder.	Total.	Duty.	Certificate of disability.	Died.	Discharged by order.	Expiration of service and mustered out.	Missing in action.	Death, other causes.	Remaining last report.	Total.
						2			13	12		1						13
						2			9		4	4					[1] 1	9
			1						3	2						1		3
						1			3	1	1						[2] 1	3
						1			7	4	3							7
							1		6		2	4						6
						2			9	9								9
									20	9	9	2						20
									2	2								2
							1		14	1	2	11						14
									1		1							1
					1	1			15	12	1						[3] 2	15
							1		14	10	4							14
									1	1								1
						1			5		4	1						5
						2			23	18	4						1	23
						1			6	2	3						1	6
						1		1	10		10							10
		1					1		12	10	2							12
				1					7	3	4							7
							1		3		3							3
	1								11	11								11
							1		8	2	5						[1] 1	8
									1								[1] 1	1
[5] 1									2		1	[5] 1						2
						1	6		50	41	9							50
									5	1	1	[6] 1					[7] 2	5
									4		2	[7] 1					[1] 1	4
									1		1							1
							3		8	1	4	2					[7] 1	8
						1	4		32	30	2							32
						2	2		17	4	10						[8] 3	17
									4		4							4
									9	7				2				9
						1			10	6	3	1						10
									1			1						1
1	1	1	1	1	1	19	21	1	346	199	99	30	....	2	....	1	15	346

[5] Remington bullet and detached brass jacket.
[6] Died in 1901.
[7] Remaining in hospital June 30, 1901.
[8] One remaining in hospital May 31, 1901, and two remaining June 30, 1901.

Gunshot wounds received in action—Continued.

VOLUNTEER ARMY 1900.

Character and location of wound.	Nature of missile.									
	Mauser.	Remington.	Krag-Jörgensen.	Winchester.	Mannlicher.	Bullet, brass.	Bullets, not stated.	Revolver.	Small shot.	Gravel propelled by striking bullets.
Head:										
Flesh	6		1				2			
Fracture	3	2								
Face:										
Flesh	2	1					5			1
Fracture	3	1					1			
Neck	7	1	1				2			
Spine, fracture	4	2					1			
Thorax:										
Nonpenetrating	7	7		2			4			
Penetrating	14	9	1				1			
Abdomen:										
Nonpenetrating	4	1					2			
Penetrating	5	5					3			
Pelvis, fracture	1	1								
Back and hip, flesh	12	6	1				4		1	
Perineum, genital and urinary organs	1	1								
Shoulder:										
Flesh	6	2					4			
Fracture clavicle or scapula	2	1								
Arm:										
Flesh	18	8	2				7			
Fracture	4	5	2				1			
Elbow joint	3	1					1			
Forearm:										
Flesh	7	2	4			1	3			
Fracture	3	3					2			
Hand, flesh	8	1					7			
Carpus and metacarpus, fracture	1	2	1							
Fingers, fracture	1						1			
Thigh:										
Flesh	27	27	2				16	1	1	
Fracture upper third	2	2	1				5			
Fracture middle third							1			
Fracture lower third	6	4					1			
Knee joint	5						1		1	
Leg:										
Flesh	15	11	3				6			
Fracture	4	6					1			
Ankle joint		1								
Foot, flesh	5	1	1				3			
Tarsus and metatarsus, fracture	4	3	1				1			
Toes, fracture			1							
Total	190	117	22	2		1	86	1	3	1

Gunshot wounds received in action—Continued.

VOLUNTEER ARMY, 1900.

Nature of missile.										Disposition.								
Brass cover of bullet.	Explosion of gun.	Fragment exploded bullet.	Explosion of powder.	Slugs.	Iron slug from cannon.	Shell.	Shrapnel.	One-pounder.	Total.	Duty.	Certificate of disability.	Died.	Discharged by order.	Expiration of service and muster out.	Missing in action.	Death, other causes.	Remaining last report.	Total.
									9	9								9
		1							6	1	3	2						6
				1					10	9	1							10
									5	2	2			1				5
									11	8	1	1	1					11
									7		2	5						7
									20	20								20
									25	11	5	8		1				25
									7	6	1							7
									13	2		11						13
				1					3	1	1			1				3
									24	23		1						24
									2	2								2
									12	10	1			1				12
1									4	3	1							4
									35	27	5	2	1					35
					1				13	4	7	1		1				13
					1				6	1	4	1						6
		1							18	17				1				18
				1					9	3	6							9
1									17	16			1					17
									4	3	1							4
									2	1	1							2
1		2			1				78	66	4	3	2	2	1			78
									10	2	5	2	1					10
									1							1		1
									11	1	9	1						11
									7	3	2	1	1					7
									35	29	4		1	1				35
									11	1	8		1	1				11
									1			1						1
									10	9	1							10
									9	2	2		2	2		1		9
									1	1								1
3		4		3	3				436	293	77	40	11	12	1	2		436

Gunshot wounds other than battle wounds.

REGULAR AND VOLUNTEER ARMIES, 1900.

Character and location of wounds.	How received.					Nature of missile.				
	In line of duty.	Not in line of duty.	Suicidal.	Homicidal.	Total.	Mauser.	Remington.	Krag-Jörgensen.	Bullets not stated.	Revolver.
Head:										
Flesh	2	3	3	1	9	.....	.....	3	4	2
Fracture	5	.....	1	1	7	.....	.....	2	2	3
Face:										
Flesh	5	.....	.....	.....	5	.....	.....	1	1	.....
Fracture	3	2	.....	.....	5	.....	.....	1	.....	4
Neck	4	1	.....	.....	5	.....	.....	3	.....	2
Thorax:										
Nonpenetrating	7	1	1	.....	9	.....	.....	2	4	2
Penetrating	5	4	7	2	18	.....	.....	3	6	9
Abdomen:										
Nonpenetrating	8	.....	.....	.....	8	.....	.....	2	3	2
Penetrating	5	2	.....	1	8	.....	.....	3	3	2
Back and hip, flesh	13	2	.....	.....	15	.....	.....	5	5	5
Perineum, genital and urinary organs	2	1	.....	.....	3	.....	.....	2	.....	1
Shoulder:										
Flesh	10	3	.....	.....	13	.....	.....	3	7	3
Joint	.....	1	.....	1	2	.....	.....	1	1	.....
Arm:										
Flesh	6	4	.....	.....	10	.....	.....	4	2	4
Fracture	1	.....	.....	.....	1	.....	.....	1	.....	.....
Elbow joint	3	.....	.....	.....	3	.....	.....	2	1	.....
Forearm:										
Flesh	12	2	.....	.....	14	.....	.....	1	2	8
Fracture	5	2	.....	.....	7	.....	.....	5	.....	2
Wrist joint	1	.....	.....	.....	1	.....	.....	.....	1	.....
Hand, flesh	38	4	.....	.....	42	1	.....	10	15	13
Carpus and metacarpus, fracture	15	4	.....	.....	19	.....	.....	10	6	3
Fingers, fracture	42	4	.....	.....	46	.....	.....	19	19	5
Thigh:										
Flesh	28	8	.....	1	37	.....	.....	8	12	15
Fracture, upper third	1	.....	.....	.....	1	.....	.....	1	.....	.....
Fracture, middle third	2	.....	.....	.....	2	.....	.....	2	.....	.....
Fracture, lower third	2	.....	.....	.....	2	.....	.....	.....	1	1
Knee joint	4	1	.....	.....	5	.....	.....	1	1	3
Leg:										
Flesh	26	1	.....	.....	27	.....	.....	4	3	20
Fracture	16	1	.....	.....	17	.....	.....	7	2	8
Ankle joint	2	1	.....	.....	3	.....	.....	3	.....	.....
Foot, flesh	22	3	.....	.....	25	.....	1	14	7	2
Tarsus and metatarsus, fracture	13	1	.....	.....	14	.....	.....	8	1	4
Toes, fracture	7	1	.....	.....	8	.....	.....	4	2	2
Total	315	57	12	7	391	1	1	135	111	125

[1] Remaining in hospital June 30, 1901.
[2] Remaining in hospital Apr. 30, 1901.

Gunshot wounds other than battle wounds.

REGULAR AND VOLUNTEER ARMIES, 1900.

Nature of missile.						Disposition.								
Small shot.	Percussion cap for dynamite shell.	Explosion of dynamite primer.	Explosion of cartridge.	Shell.	Total.	Duty.	Certificates of disability.	Died.	Discharged by order.	Mustered out.	Deserted.	Death, other causes.	Remaining last report.	Total.
.....	.....	.....	.....	.....	9	9	.....	.....	.....	.....	.....	.....	.....	9
.....	.....	.....	.....	.....	7	.....	3	4	.....	.....	.....	.....	.....	7
.....	.....	.....	3	.....	5	4	1	.....	.....	.....	.....	.....	.....	5
.....	.....	.....	.....	.....	5	4	.....	.....	1	.....	.....	.....	.....	5
.....	.....	.....	.....	.....	5	5	.....	.....	.....	.....	.....	.....	.....	5
.....	.....	.....	.....	1	9	8	.....	.....	.....	.....	.....	1	.....	9
.....	.....	.....	.....	.....	18	8	3	6	.....	.....	.....	.....	[1]	18
.....	.....	.....	1	.....	8	8	.....	.....	.....	.....	.....	.....	.....	8
.....	.....	.....	.....	.....	8	2	.....	6	.....	.....	.....	.....	.....	8
.....	.....	.....	.....	.....	15	14	.....	.....	.....	1	.....	.....	.....	15
.....	.....	.....	.....	.....	3	3	.....	.....	.....	.....	.....	.....	.....	3
.....	.....	.....	.....	.....	13	11	1	.....	1	.....	.....	.....	.....	13
.....	.....	.....	.....	.....	2	.....	2	.....	.....	.....	.....	.....	.....	2
.....	.....	.....	.....	.....	10	10	.....	.....	.....	.....	.....	.....	.....	10
.....	.....	.....	.....	.....	1	1	.....	.....	.....	.....	.....	.....	.....	1
.....	.....	.....	.....	.....	3	1	1	.....	.....	.....	.....	.....	[2]1	3
2	.....	.....	1	.....	14	13	1	.....	.....	.....	.....	.....	.....	14
.....	.....	.....	.....	.....	7	4	3	.....	.....	.....	.....	.....	.....	7
.....	.....	.....	.....	.....	1	.....	1	.....	.....	.....	.....	.....	.....	1
.....	.....	.....	3	.....	42	40	.....	1	.....	.....	.....	.....	[3]1	42
.....	.....	.....	.....	.....	19	10	7	.....	.....	.....	.....	1	[4]1	19
1	1	1	.....	.....	46	35	8	.....	.....	1	2	.....	.....	46
1	.....	.....	1	.....	37	36	.....	1	.....	.....	.....	.....	.....	37
.....	.....	.....	.....	.....	1	1	.....	.....	.....	.....	.....	.....	.....	1
.....	.....	.....	.....	.....	2	.....	1	1	.....	.....	.....	.....	.....	2
.....	.....	.....	.....	.....	2	.....	.....	1	.....	.....	.....	.....	[3]1	2
.....	.....	.....	.....	.....	5	.....	3	.....	.....	.....	1	1	.....	5
.....	.....	.....	.....	.....	27	23	1	.....	1	1	.....	.....	[3]1	27
.....	.....	.....	.....	.....	17	11	3	1	.....	.....	.....	.....	[4]2	17
.....	.....	.....	.....	.....	3	.....	1	1	.....	.....	.....	.....	[3]1	3
1	.....	.....	.....	.....	25	21	.....	.....	.....	.....	.....	.....	[4]1	25
.....	.....	.....	1	.....	14	7	7	.....	.....	.....	.....	.....	.....	14
.....	.....	.....	.....	.....	8	7	1	.....	.....	.....	.....	.....	.....	8
5	1	1	10	1	391	299	48	22	3	3	3	3	10	391

[3] Remaining in hospital May 31, 1901.
[4] Remaining in hospital May 31, 1901, and June 30, 1901.

Gunshot wounds other than battle wounds—Continued.

REGULAR ARMY, 1900.

Character and location of wounds.	How received.					Nature of missile.				
	In line of duty.	Not in line of duty.	Suicidal.	Homicidal.	Total.	Mauser.	Remington.	Krag-Jörgensen.	Bullets not stated.	Revolver.
Head:										
Flesh	2	2	3	1	8	.....	.....	2	4	2
Fracture	4	.....	1	1	6	.....	.....	2	2	2
Face:										
Flesh	3	.....	.....	.....	3	.....	.....	.....	1	.....
Fracture	2	2	.....	.....	4	.....	.....	1	.....	3
Neck	2	1	.....	.....	3	.....	.....	1	.....	2
Thorax:										
Nonpenetrating	5	1	1	.....	7	.....	.....	1	3	2
Penetrating	3	3	6	2	14	.....	.....	3	4	7
Abdomen:										
Nonpenetrating	5	.....	.....	.....	5	.....	.....	1	2	2
Penetrating	2	2	.....	1	5	.....	.....	1	2	2
Back and hip, flesh	8	2	.....	.....	10	.....	.....	4	3	3
Perineum, genital and urinary organs	1	.....	.....	.....	1	.....	.....	1	.....	.....
Shoulder:										
Flesh	3	3	.....	.....	6	.....	.....	1	4	1
Joint	.....	.....	.....	1	1	.....	.....	1	.....	.....
Arm, flesh	4	2	.....	.....	6	.....	.....	3	1	2
Elbow joint	1	.....	.....	.....	1	.....	.....	.....	1	.....
Forearm:										
Flesh	7	2	.....	.....	9	.....	.....	.....	1	5
Fracture	1	1	.....	.....	2	.....	.....	1	.....	1
Hand, flesh	18	3	.....	.....	21	.....	.....	4	8	6
Carpus and metacarpus, fracture	8	2	.....	.....	10	.....	.....	6	1	3
Fingers, fracture	19	3	.....	.....	22	.....	.....	5	11	3
Thigh:										
Flesh	19	8	.....	1	28	.....	.....	4	11	11
Fracture, upper third	1	.....	.....	.....	1	.....	.....	1	.....	.....
Fracture, middle third	1	.....	.....	.....	1	.....	.....	1	.....	.....
Fracture, lower third	2	.....	.....	.....	2	.....	.....	.....	1	1
Knee joint	2	1	.....	.....	3	.....	.....	.....	1	2
Leg:										
Flesh	12	.....	.....	.....	12	.....	.....	1	2	9
Fracture	9	1	.....	.....	10	.....	.....	4	.....	6
Ankle joint	1	1	.....	.....	2	.....	.....	2	.....	.....
Foot, flesh	5	.....	.....	.....	5	.....	.....	2	1	1
Tarsus and metatarsus, fracture	8	.....	.....	.....	8	.....	.....	2	1	4
Toes, fracture	1	1	.....	.....	2	.....	.....	.....	1	1
Total	159	41	11	7	218	.....	.....	55	66	81

[1] Remaining in hospital June 30, 1901.
[2] Remaining in hospital Apr. 30, 1901.

Gunshot wounds other than battle wounds—Continued.

REGULAR ARMY, 1900.

Nature of missile.						Disposition.								
Small shot.	Percussion cap for dynamite shell.	Explosion of dynamite primer.	Explosion of cartridge.	Shell.	Total.	Duty.	Certificates of disability.	Died.	Discharged by order.	Mustered out.	Deserted.	Death, other causes.	Remaining last report.	Total.
					8	8								8
					6		3	3						6
			2		3	3								3
					4	3			1					4
					3	3								3
				1	7	6						1		7
					14	6	3	4					[3]1	14
					5	5								5
					5	2		3						5
					10	10								10
					1	1								1
					6	6								6
					1		1							1
					6	6								6
					1								[2]1	1
2			1		9	8	1							9
					2	1	1							2
			3		21	20							[3]1	21
					10	5	4						[3]1	10
1	1	1			22	17	4				1			22
1			1		28	27		1						28
					1	1								1
					1			1						1
					2			1					[3]1	2
					3		2				1			3
					12	11							[3]1	12
					10	6	2						[4]2	10
					2			1					[3]1	2
1					5	4							[2]1	5
			1		8	4	4							8
					2	1	1							2
5	1	1	8	1	218	164	26	14	1		2	1	10	218

[3] Remaining in hospital May 31, 1901.
[4] Remaining in hospital May 31, 1901, and June 30, 1901.

Gunshot wounds other than battle wounds—Continued.

VOLUNTEER ARMY, 1900.

Character and location of wounds.	How received.					Nature of missile.				
	In line of duty.	Not in line of duty.	Suicidal.	Homicidal.	Total.	Mauser.	Remington.	Krag-Jörgensen.	Bullets not stated.	Revolver.
Head:										
Flesh		1			1			1		
Fracture	1				1					1
Face:										
Flesh	2				2			1		
Fracture	1				1					1
Neck	2				2			2		
Thorax:										
Nonpenetrating	2				2			1	1	
Penetrating	2	1	1		4				2	2
Abdomen:										
Nonpenetrating	3				3			1	1	
Penetrating	3				3			2	1	
Back and hip, flesh	5				5			1	2	2
Perineum, genital and urinary organs	1	1			2			1		1
Shoulder:										
Flesh	7				7			2	3	2
Joint		1			1				1	
Arm:										
Flesh	2	2			4			1	1	2
Fracture	1				1			1		
Elbow joint	2				2			2		
Forearm:										
Flesh	5				5			1	1	3
Fracture	4	1			5			4		1
Wrist joint	1				1				1	
Hand, flesh	20	1			21	1		6	7	7
Carpus and metacarpus, fracture	7	2			9			4	5	
Fingers, fracture	23	1			24			14	8	2
Thigh:										
Flesh	9				9			4	1	4
Fracture, middle third	1				1			1		
Knee joint	2				2			1		1
Leg:										
Flesh	14	1			15			3	1	11
Fracture	7				7			3	2	2
Ankle joint	1				1			1		
Foot, flesh	17	3			20		1	12	6	1
Tarsus and metatarsus, fracture	5	1			6			6		
Toes, fracture	6				6			4	1	1
Total	156	16	1		173	1	1	80	45	44

Gunshot wounds other than battle wounds—Continued.

VOLUNTEER ARMY, 1900.

Nature of missile.						Disposition.								
Small shot.	Percussion cap for dynamite shell.	Explosion of dynamite primer.	Explosion of cartridge.	Shell.	Total.	Duty.	Certificates of disability.	Died.	Discharged by order.	Mustered out.	Deserted.	Death, other causes.	Remaining last report.	Total.
					1	1								1
					1			1						1
			1		2	1	1							2
					1	1								1
					2	2								2
					2	2								2
					4	2		2						4
			1		3	3								3
					3			3						3
					5	4				1				5
					2	2								2
					7	5	1		1					7
					1		1							1
					4	4								4
					1	1								1
					2	1	1							2
					5	5								5
					5	3	2							5
					1		1							1
					21	20		1						21
					9	5	3					1		9
					24	18	4			1	1			24
					9	9								9
					1		1							1
					2		1					1		2
					15	12	1		1	1				15
					7	5	1	1						7
					1		1							1
					20	20								20
					6	3	3							6
					6	6								6
			2		173	135	22	8	2	3	1	2		173

Of the 92 cases which terminated fatally, 28 deaths occurred among 35 penetrating wounds of the abdomen, a mortality of 80 per cent, as compared with 70 per cent in the years 1898 and 1899. Laparotomy was performed in 4 of the 28 cases, and an abrasion of the ileum was sutured in 1 of the 7 cases which recovered. Of these cases, 5 were returned to duty and 2 discharged on certificates of disability.

Sixteen of the 92 deaths occurred among 63 penetrating wounds of the thorax, a mortality of 25.4 per cent, as compared with 27.8 during 1898 and 1899.

Fractures of the femur had a mortality of 19 per cent caused by 7 deaths among 37 patients, as against 11 per cent in 1898 and 1899. During the past year, however, the total number of cases was smaller and the relative number of upper third fractures larger than in the years cited. Fractures of the knee joint had a mortality of 15 per cent.

The mortality in fractures of the spine constituted 69.2 per cent of the cases, 13, of which 9 were fatal, and fractures of the skull were 45.5 per cent fatal—10 deaths in 22 cases.

The following tables show the statistical details in these fatal cases:

Gunshot wounds which terminated fatally.

REGULAR AND VOLUNTEER ARMIES, 1900.

Character and location of wound.	How received.						Nature of missile.								
		Not in action.					In action.						Not in action.		
	In action.	In line of duty.	Not in line of duty.	Suicide.	Homicide.	Total.	Mauser.	Remington.	Bullet, not stated.	Brass cover of bullet.	Shell.	Shrapnel.	Krag-Jörgensen.	Bullet, not stated.	Revolver.
Head:															
Flesh	1					[1] 1			1						
Fracture	6	2		1	1	[2] 10		3	2		1			1	3
Neck	1					1		1							
Spine, fracture	9					[3] 9	3	1	4			1			
Thorax, penetrating	10	1	2	3		[4] 16	5	3	2					5	1
Abdomen, penetrating	22	5			1	[5] 28	7	6	8			1	3	2	1
Back and hip, flesh	1					[6] 1	1								
Shoulder joint	1					[7] 1					1				
Arm:															
Flesh	2					[8] 2		2							
Fracture	1					[9] 1		1							
Elbow joint	1					[10] 1		1							
Hand, flesh		1				[11] 1							1		
Hip joint	1					[12] 1				1					

[1] Skull trephined for traumatic acute diffuse meningitis; died of traumatic acute diffuse meningitis.
[2] Removal of fragments of bone in two cases. Death after skull trephining in two cases.
[3] Tetanus in one case.
[4] Septicæmia in one case. In another, pneumonia in right lung and gangrene in left. Cartilage and bone removed.
[5] Septic infection in one case. Laparotomy in four cases.
[6] Septicæmia.
[7] Amputation at shoulder joint.
[8] Brachial artery severed in one case. In the other amputation at shoulder, with death from gangrene
[9] Died of shock following amputation at shoulder joint.
[10] Amputation 3 inches above elbow joint.
[11] Tetanus.
[12] Remington bullet with detached brass jacket removed; fragments bone removed; died of septic infection.

Gunshot wounds which terminated fatally—Continued.

REGULAR AND VOLUNTEER ARMIES, 1900—Continued.

Character and location of wound.	How received.						Nature of missile.								
		Not in action.					In action.						Not in action.		
	In action.	In line of duty.	Not in line of duty.	Suicide.	Homicide.	Total.	Mauser.	Remington.	Bullet, not stated.	Brass cover of bullet	Shell.	Shrapnel.	Krag Jorgensen.	Bullet, not stated.	Revolver.
Thigh: Flesh	3				1	[1]4	1	1	1						1
Fracture, upper third	3					[2]3			3						
Fracture, middle third	1	1				[3]2		1					1		
Fracture, lower third	1	1				[4]2		1						1	
Knee joint	3					[5]3	1	1				1			
Leg, fracture		1				[6]1							1		
Ankle joint	1		1			[7]2		1					1		
Tarsus and metatarsus, fracture	1					[8]1			1						
Unknown	1					[9]1			1						
Total	70	12	3	4	3	92	18	23	23	1	2	3	7	9	6

REGULAR ARMY, 1900.

Head: Flesh	[10]1					1			1						
Fractures	[11]4	1		1	[12]1	7		1	2		1			1	2
Spine, fracture	4					4			3			1			
Thorax, penetrating	2		[8]1	3		6		1	1					3	1
Abdomen, penetrating	[13]11	2			1	14	4	1	5			1	1	1	1
Shoulder joint	[14]1					1					1				
Hip joint	[15]1					1				1					
Thigh: Flesh					[16]1	1									1
Fracture, upper third	[17]1					1			1						
Fracture, middle third	[18]1	[19]1				2		1					1		
Fracture, lower third		[20]1				1								1	
Knee joint	[21]2					2		1				1			
Ankle joint			[22]1			1							1		
Tarsus and metatarsus, fracture	[22]1					1			1						
Unknown	[9]1					1			1						
Total	30	5	2	4	3	44	4	5	15	1	2	3	3	6	5

[1] Tetanus in one case. Septicæmia in another. Traumatic femoral aneurism and gangrene of foot in another. No remarks in the fourth.

[2] One died in 1901 after operation by naval surgeon. In another, fragments bone removed; septic infection. In the other, fragments bone removed with later excision of head of femur; died of septicæmia and shock.

[3] In one case fragments bone removed and marrow cavity curetted; septicæmia. In the other, amputation upper third thigh; died of shock.

[4] In one case exhaustion following primary shock. In the other, amputation lower third thigh; died of shock.

[5] In one case pyæmia. In another, death from septic arthritis knee after removal of piece of shell from knee. The other was wounded May 11; fragments bone removed May 11; amputation upper third thigh July 20; died August 11, sepsis and exhaustion.

[6] Amputation above knee; died of shock following operation.

[7] Amputation of leg in one case; died of septicæmia. In the other, amputation lower third thigh for gangrene; collapse during operation.

[8] Septicæmia.

[9] Died while a prisoner in hands of insurgents.

[10] Skull trephined for traumatic acute diffuse meningitis; died of traumatic acute diffuse meningitis.

[11] One died after operation for removal of fragments of bone and one died after trephining of skull.

[12] Death after trephining skull.

[13] Laparotomy in two cases, in one of which there was excision of 4 inches of ragged gut, ends joined by Murphy's button. In the other, perforation of ½-inch in ileum was sewed up with Lembert suture.

[14] Amputation at shoulder joint.

[15] Remington bullet with detached brass jacket removed; fragments bone removed; died of septic infection.

[16] Tetanus.

[17] Died in 1901 after operation by naval surgeon.

[18] Fragments bone removed and marrow cavity curetted; died of septicæmia.

[19] Amputation, upper third thigh; died of shock.

[20] Amputation, lower third thigh; died of shock.

[21] In one there was removal of piece of shell from knee; died of septic arthritis of knee. The other was wounded May 11; fragments bone removed May 11; amputation upper third thigh, July 20. Died August 19 of sepsis and exhaustion.

[22] Amputation of leg; died of septicæmia.

Gunshot wounds which terminated fatally—Continued.

VOLUNTEER ARMY 1900.

Character and location of wound.	How received.						Nature of missile.								
	Not in action.						In action.						Not in action.		
	In action.	In line of duty.	Not in line of duty.	Suicide.	Homicide.	Total.	Mauser.	Remington.	Bullet, not stated.	Brass cover of bullet.	Shell.	Shrapnel.	Krag-Jörgensen.	Bullet, not stated.	Revolver.
Head, fracture	[1]2	1	....	....	....	3	....	2	....	....	....	....	....	....	1
Neck	1	....	....	....	....	1	....	1	....	....	....	....	....	....	....
Spine, fracture	[2]5	....	....	....	....	5	3	1	1	....	....	....	....	....	....
Thorax, penetrating	[3]8	1	1	....	....	10	5	2	1	....	....	....	....	2	....
Abdomen, penetrating	[4]11	3	....	....	....	14	3	5	3	....	....	....	2	1	....
Back and hip, flesh	[5]1	....	....	....	....	1	1	....	....	....	....	....	....	....	....
Arm:															
Flesh	[6]2	....	....	....	....	2	....	2	....	....	....	....	....	....	....
Fracture	[7]1	....	....	....	....	1	....	1	....	....	....	....	....	....	....
Elbow joint	[8]1	....	....	....	....	1	....	1	....	....	....	....	....	....	....
Hand, flesh	....	[9]1	....	....	....	1	....	....	....	....	....	....	1	....	....
Thigh:															
Flesh	[10]3	....	....	....	....	3	1	1	1	....	....	....	....	....	....
Fracture, upper third	[11]2	....	....	....	....	2	....	....	2	....	....	....	....	....	....
Fracture, lower third	[12]1	....	....	....	....	1	....	1	....	....	....	....	....	....	....
Knee joint	[13]1	....	....	....	....	1	1	....	....	....	....	....	....	....	....
Leg, fracture	....	[14]1	....	....	....	1	....	....	....	....	....	....	1	....	....
Ankle joint	[15]1	....	....	....	....	1	....	1	....	....	....	....	....	....	....
Total	40	7	1	....	....	48	14	18	8	....	....	....	4	3	1

[1] Small spiculæ of bone removed in one case.
[2] Tetanus in one case.
[3] Pneumonia in right lung, and gangrene in left lung in one case. Cartilage and bone removed.
[4] Septic infection in one case. Laparotomy in two cases, in one of which Murphy's button was used.
[5] Septicæmia.
[6] Brachial artery severed in one case. Amputation at shoulder in the other, with death from gangrene.
[7] Died of shock following amputation of shoulder joint.
[8] Amputation 3 inches above elbow joint.
[9] Tetanus.
[10] Septicæmia in one case. In another case, traumatic femoral aneurism and gangrene of foot. No remarks on third case.
[11] Fragments bone removed; septic infection in one case. In the other, fragments bone removed with later excision of head of femur; died of septicæmia and shock.
[12] Exhaustion following primary shock.
[13] Pyæmia.
[14] Amputation above knee; died of shock following operation.
[15] Amputation of lower third thigh for gangrene; collapse during operation.

Surgical work was reported in connection with 208 of these gunshot wounds; 171 of the patients recovered, 27 died, and 10 remained under treatment at latest reports. The discovery and removal of the missile was due to the use of the X-ray in 4 cases. Cartilage and bone were removed in 1 case of penetrating wound of the thorax which proved fatal, and in another, which was successful, a portion of the seventh rib was removed. Five laparotomies were performed, only 1 of which had a favorable termination. A fracture of the pelvis was reported in which two and a half months after the injury the wound was enlarged and a piece of drainage tube 5 inches long was removed. Amputation at the shoulder joint was performed in 4 cases, with only 1 recovery. The arm was amputated in 6 cases, 1 of which proved fatal; the forearm in 3 cases and parts of the hand in 50 cases, in 1 of which death occurred from chloroform narcosis. Amputation was performed at the hip joint in 1 case and disarticulation in 2 cases—all successful,

while 1 case of excision of the head of the femur was fatal from septicæmia. Five cases of amputation of the thigh were fatal, 7 recovered, while 1 remains under treatment. Four of these amputations of the thigh were for fractures of the leg, 1 for a flesh wound of the leg infected by the bacillus aerogenes capsulatus, 3 for fractures of the knee joint, 4 for fractures of the femur, and 1 for a flesh wound of the thigh in which the femoral artery was severed. Three of the deaths were from shock, 1 from sepsis, and 1 from chronic dysentery. One knee-joint amputation was successful. Seven amputations of the leg ended in recovery and 1 in death from septicæmia in a fracture of the ankle. Besides several resections and excisions the femoral artery was ligated in 3 cases, the brachial in 2 cases, and the posterior tibial in 1 case.

The details of this surgical work are given in the following table:

Surgical operations for gunshot wounds.

REGULARS AND VOLUNTEERS, 1900.

Character and location of wound.	Operation.	Result.		
		Recovered.	Died.	Remaining last report.
Head:				
Flesh	Skull trephined for traumatic acute diffuse meningitis.	.....	[1]1	.....
Fracture	Bullet located by X-ray and removed	1	.....	.....
Do	Fragments of bone removed	2	2	.....
Do	Craniotomy for necrosis of skull	1	.....	.....
Do	Trephining	1	2	.....
Face:				
Flesh	Enucleation of eye	1	.....	.....
Fracture	Bullet removed	1	.....	.....
Do	Bullet located by X-ray and removed	1	.....	.....
Do	Excision of sup. maxilla	1	.....	.....
Do	Fragments of bone removed	1	.....	.....
Do	Necrosed bone removed	1	.....	.....
Spine, fracture	Pieces of jacket of cartridge removed	1	.....	.....
Thorax, penetrating	Bullet removed	1	.....	1
Do	Cartilage and bone removed	.....	1	.....
Do	Blood removed by aspiration	1	.....	.....
Do	Large quantities of blood and bloody fluid removed by aspiration September 28, October 10, and October 14; resection of 1¼ inches of right seventh rib October 17; large drainage tube inserted.	1	.....	.....
Abdomen, penetrating	Laparotomy	.....	4	.....
Do	Celiotomy; abrasions in ileum sutured	1	.....	.....
Do	Bone curetted on 4 different occasions (wounded in 1899 in iliac region, penetrating abdomen).	1	.....	.....
Pelvis, fracture	Carious bone curetted (wounded in 1899)	1	.....	.....
Do	Sequestra removed from lower border right pelvic bone and fistulous tract cauterized.	1	.....	.....
Do	Wound enlarged and denuded bone curetted	1	.....	.....
Do	Wound enlarged 2½ months after date of wound and drainage tube 5 inches long found therein.	1	.....	.....
Perineum, genital, and urinary organs.	Bullet extracted (wounded in 1899)	1	.....	.....
Do	Testicle removed	1	.....	.....
Shoulder:				
Flesh	Bullet located by X-ray and removed	1	.....	.....
Fracture clavicle or scapula.	Fragments of bone removed	1	.....	.....
Do	Fragments of bone and part of brass shell covering of bullet removed.	1	.....	.....
Shoulder joint	Amputation at shoulder joint	.....	1	.....
Do	Fragments of scapula and bullet removed	1	.....	.....
Arm, flesh	Amputation at shoulder joint for gangrene	.....	[3]1	.....
Do	Ligation of brachial artery	2	.....	.....
Do	1¼ inches of musculo-spiral nerve removed; ends brought together with fine silk sutures.	1	.....	.....
Arm, fracture	Incision for liberation of musculo-spiral nerve from compression on fractured ends of bone.	1	.....	.....
Do	Removal of fragments of bone	1	.....	1
Do	Removal of pieces of jacket of bullet pressing on nerve.	1	.....	.....
Do	Removal of fragments of shell and bone	1	.....	.....
Do	Amputation at shoulder for gangrene	1	.....	.....
Do	Amputation at shoulder joint	.....	[4]1	.....
Do	Amputation arm through upper third	1	.....	.....
Do	Operation for necrosis of humerus	1	.....	.....
Elbow joint	Bullet removed	1	.....	.....
Do	Fragments of bone removed	1	.....	1
Do	Fragments of bone removed July 3; arm amputated July 6 for infection.	1	.....	.....
Do	Amputation of arm upper third July 13; flaps opened and drained July 17 for suppuration.	1	.....	.....
Do	Amputation 3 inches above elbow joint	.....	1	.....
Do	Resection elbow joint	2	.....	.....
Do	Ankylosis fingers, wrist, and elbow broken up; fibrous union of humerus refractured.	1	.....	.....
Forearm, fracture	Fragments of bone removed	7	.....	.....

[1] Died of traumatic acute diffuse meningitis. [2] Death from gangrene.

Surgical operations for gunshot wounds.

REGULARS AND VOLUNTEERS, 1900.

Nature of missile.														
Mauser.	Remington.	Krag-Jörgensen.	Mannlicher.	Bullets, not stated.	Revolver.	Slugs.	Shell.	Shrapnel.	Explosion of dynamite primer.	Percussion cap for dynamite shell.	One-pounder.	Iron slug from cannon.	Explosion of cartridge.
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		1											
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				1									
	1	4		1	1								

[3] Died of shock following operation.

[4] Bullet 2¼ inches long, made of scrap iron.

Surgical operations for gunshot wounds—Continued.

REGULARS AND VOLUNTEERS, 1900—Continued.

Character and location of wound.	Operation.	Result.		
		Recovered.	Died.	Remaining last report.
Forearm, fracture	Fragments of bone removed and ends of ulna and radius spliced and wired February 27; amputation April 17 above elbow for necrosis.	1		
Do	Fragments of bone removed and later resection of broken ends of radius and ulna.	1		
Do	Slugs removed on admission in January and 5 inches of radius removed in June.	1		
Do	Amputation of forearm	2		
Do	Amputation above elbow May 1. Reamputation at junction of middle and upper thirds of humerus May 7. On account of supposed hæmophilia, tourniquet was left on arm, resulting in gangrene, and natural amputation at level of axilla. Remaining necrosed shaft of humerus and head removed July 5.	1		
Do	Resection of radius	1		
Wrist joint	Amputation forearm; reamputation elbow joint	1		
Hand, flesh	Amputation fingers	2		
Carpus and metacarpus, fracture.	Amputation fingers and metacarpal bones	3		
Do	Amputation fingers	4	[1]1	1
Do	Amputation arm	1		
Do	Dead bone removed	1		
Do	Necrosed bone curetted	1		
Do	Portion of fourth metacarpal bone removed. Adhesions of joints second and third fingers broken up.	1		
Do	Amputation finger September 24, 1900[2]			1
Do	Extensor tendon of third finger severed: 6 inches of exposed tendons of flexor sublimus digitorum, and flexors middle and index fingers excised.[2]	1		
Fingers, fracture	Amputation fingers	39		
Do	Projecting pieces of bone trimmed off	1		
Hip joint	Removal of fragments of bone, bullet, and detached brass jacket.		[3]1	
Thigh, flesh	Ligation of femoral artery	2		
Do	Amputation at junction of middle and lower third thigh, bullet having severed femoral artery.	1		
Thigh, fracture upper third	Dead bone removed			1
Do	Ends of femur brought together and wired April 12. Disarticulation at hip May 28	1		
Do	Fragments of bone and piece of bullet removed	1		
Do	Piece of bone removed	1		
Do	Removal of fragments of gunstock, lead, bullet jacket and bone December 18, 1900.[4]	1		
Do	Removal of fragments of bone		[5]1	
Do	Removal of fragments of bone April 12; head of femur excised April 21.		[6]1	
Thigh, fracture middle third	Bullet removed			1
Do	Fragments of bone removed	1		
Do	Fragments of bone removed and marrow cavity curetted.		[7]1	
Do	Amputation at hip joint (wounded in 1899)	1		
Do	Amputation upper third thigh		[8]1	
Do	Amputation for gangrene	1		
Thigh, fracture lower third	Carious bone removed	2		
Do	Fragments of bone removed	2		
Do	Fragments of bone removed in March and May; necrosed bone curetted October 26; amputation upper third thigh November 24.	1		
Do	Bullet and fragments of bone removed March 27; wounds incised and pus removed May 26.	1		
Do	Amputation lower third thigh		[8]1	
Do	Removal of 1½ inches of lower fragment of femur	1		
Knee joint	Bullet removed	2		
Do	Fragments of bone and dead tissue removed	1		
Do	Fragments of bone, bullet, and shell removed	1		

[1] Died of chloroform narcosis.
[2] Wrist amputation in 1901.
[3] Septic infection.
[4] Disarticulation of femur, for sepsis, 1901.

Surgical operations for gunshot wounds—Continued.

REGULARS AND VOLUNTEERS, 1900—Continued.

Nature of missile.													
Mauser.	Remington.	Krag-Jörgensen.	Mannlicher.	Bullets, not stated.	Revolver.	Slugs.	Shell.	Shrapnel.	Explosion of dynamite primer.	Percussion cap for dynamite shell.	One pounder.	Iron slug from cannon.	Explosion of cartridge.
						1							
	1												
						1							
	2												
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[5] Died of septic infection.
[6] Died of septicæmia and shock.
[7] Died of septicæmia.
[8] Died of shock following operation.

Surgical operations for gunshot wounds—Continued.

REGULARS AND VOLUNTEERS, 1900—Continued.

Character and location of wound.	Operation.	Result.		
		Recovered.	Died.	Remaining last report.
Knee joint	Piece of shell removed	.....	[1]1	.....
Do	Fragments of bone removed May 11; amputation upper third thigh July 20.	.....	[2]1	.....
Do	Amputation through knee joint	1	.....	.....
Do	Amputation middle third thigh	1	[3]1	.....
Leg, flesh	Amputation middle third thigh for bacillus capsulatus.	1	.....	.....
Do	Bullet located by X-ray and removed	1	.....	.....
Do	Femoral artery ligated for popliteal aneurism	1	.....	.....
Leg, fracture	Bullet removed	1	.....	.....
Do	Fragments of bone removed	5	.....	.....
Do	Fragments of bone removed and marrow cavity curetted.	.....	.....	1
Do	Removal of bone and several pieces of metal	1	.....	.....
Do	Fragments of bone removed April 22; carious bone removed May 28.	.....	.....	1
Do	Amputation below knee	3	.....	.....
Do	Amputation lower third thigh for osteitis	.....	.....	1
Do	Amputation above knee	.....	[4]1	.....
Do	Amputation leg July 2; amputation middle third thigh Nov. 3.	1	.....	.....
Do	Amputation thigh, junction lower and middle thirds, December 18, 1900. 1 inch more removed February 8, 1901.	1	.....	.....
Do	Ends of fragments of bone freshened and a portion removed from upper fragment and placed in apposition.	1	.....	.....
Do	Resection of fibula	1	.....	.....
Ankle joint	Amputation of leg	.....	[5]1	.....
Do	Amputation lower third thigh for gangrene	.....	[6]1	.....
Tarsus and metatarsus, fracture.	Bullet removed	1	.....	.....
Do	Fragments of bone removed	2	.....	.....
Do	Fragments of bone and eyelet of shoe removed	1	.....	.....
Do	Amputation of leg for gangrene	1	.....	.....
Do	Amputation of toe	1	.....	.....
Do	Secondary amputation junction lower and middle third leg.	1	.....	.....
Do	Fragments of bone removed April 12; remainder third metatarsal bone removed April 21; amputation of leg April 23 to save life.	1	.....	.....
Do	Ligation of posterior tibial artery for secondary hemorrhage.	1	.....	.....
Toes, fracture	Amputation toes	7	.....	.....
Do	Dead bone removed	1	.....	.....
Do	Shattered phalanx curetted and spiculæ removed	1	.....	.....
Total		171	27	10

[1] Died of septic arthritis, knee.
[2] Died of sepsis and exhaustion.
[3] Died of chronic dysentery.

Surgical operations for gunshot wounds—Continued.

REGULARS AND VOLUNTEERS, 1900—Continued.

Nature of missile.													
Mauser.	Remington.	Krag-Jörgensen.	Mannlicher.	Bullets, not stated.	Revolver.	Slugs.	Shell.	Shrapnel.	Explosion of dynamite primer.	Percussion cap for dynamite shell.	One-pounder.	Iron slug from cannon.	Explosion of cartridge.
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	1												
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		1											
		5		1	1								
				1									
					1								
34	40	48	2	49	18	2	7	3	1	1	1	1	

[4] Died of shock following operation.
[5] Died of septicæmia.
[6] Collapse during operation.

Besides the gunshot wounds received in action, the battle casualties of the year included 41 men killed and 83 men wounded, mostly by the bolo, kris, or spear. Five of the 83 wounded died of their wounds.

Killed in action, caused by wounds other than gunshot.

REGULARS AND VOLUNTEERS, 1900.

Character and location of wounds.	Regulars.	Volunteers.					Total regulars and volunteers.
	Bolo.	Bolo.	Dagger.	Spear.	Kris.	Total.	
Head, fracture	3	7	.....	.....	.....	7	10
Neck	.....	3	.....	.....	1	4	4
Thorax, penetrating	.....	7	1	1	.....	9	9
Abdomen, penetrating	.....	4	.....	1	.....	5	5
Shoulder	.....	1	.....	.....	.....	1	1
Unknown	2	10	.....	.....	.....	10	12
Total	5	32	1	2	1	36	41

Wounds other than gunshot received in action.

REGULARS AND VOLUNTEERS, 1900.

Character and location of wounds.	Weapon.									Total.	Disposition.					
	Bolo.	Dagger.	Spear.	Bamboo spear.	Lance.	Arrow.	Heated arrow.	Club.	Rock.		Duty.	Certificates of disability.	Died.	Order.	Muster out.	Remaining last report.
Head:																
Flesh	3	.....	.....	.....	.....	.....	.....	1	1	5	5	.....	.....	.....	.....	.....
Fracture	5	.....	.....	.....	.....	.....	.....	.....	.....	5	1	1	1	[1]1	.....	[2]1
Neck	1	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	1	.....	.....	.....
Thorax:																
Nonpenetrating	3	.....	.....	.....	.....	.....	1	.....	.....	4	4	.....	.....	.....	.....	.....
Penetrating	2	.....	.....	1	.....	.....	.....	.....	.....	3	1	.....	1	.....	1	.....
Abdomen:																
Nonpenetrating	1	.....	.....	1	.....	.....	.....	.....	.....	2	2	.....	.....	.....	.....	.....
Penetrating	1	1	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	2	.....	.....	.....
Back and hip, flesh	6	.....	.....	1	.....	.....	.....	.....	.....	7	6	.....	.....	1	.....	.....
Shoulder:																
Flesh	4	.....	.....	.....	.....	.....	.....	.....	.....	4	4	.....	.....	.....	.....	.....
Joint	1	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1	.....	.....	.....	.....
Arm:																
Flesh	3	2	.....	1	.....	.....	.....	.....	.....	6	3	[3]3	.....	.....	.....	.....
Fracture	1	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	[4]1	.....	.....	.....	.....
Forearm:																
Flesh	5	1	.....	3	.....	.....	.....	.....	.....	9	9	.....	.....	.....	.....	.....
Fracture	1	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1	.....	.....	.....	.....
Hand, flesh	8	.....	1	2	.....	.....	.....	.....	.....	11	11	.....	.....	.....	.....	.....
Carpus and metacarpus, fracture	2	.....	.....	.....	.....	.....	.....	.....	.....	2	1	1	.....	.....	.....	.....
Fingers, fracture	3	.....	.....	.....	.....	.....	.....	.....	.....	3	[5]2	.....	.....	.....	.....	[6]1
Thigh, flesh	2	.....	1	6	.....	.....	.....	.....	.....	9	8	.....	.....	.....	1	.....
Knee joint	.....	.....	.....	.....	1	.....	.....	.....	.....	1	.....	1	.....	.....	.....	.....
Leg, flesh	2	.....	.....	1	.....	2	.....	.....	.....	5	5	.....	.....	.....	.....	.....
Tarsus and metatarsus, fracture	1	.....	.....	.....	.....	.....	.....	.....	.....	1	1	.....	.....	.....	.....	.....
Total	55	4	2	16	1	2	1	1	1	83	63	9	5	2	2	2

[1] Pieces of bone removed.
[2] Skull trephined. Remaining in hospital May 31, 1901.
[3] In one case, bulbous swelling on musculo-spiral nerve excised and nerve sutured. In another case, injured portion musculo-spiral nerve resected, ends sutured, and ends of severed biceps muscle fastened and sutured. In another case, amputation at shoulder joint for gangrene, brachial artery having been severed.
[4] Arm amputated.
[5] In one case, finger amputated.
[6] Remaining in hospital March 31, 1901.

Wounds other than gunshot received in action—Continued.

REGULARS, 1900.

Character and location of wounds.	Weapon.										Disposition.					
	Bolo.	Dagger.	Spear.	Bamboo spear.	Lance.	Arrow.	Heated arrow.	Club.	Rock.	Total.	Duty.	Certificates of disability.	Died.	Order.	Muster out.	Remaining last report
Head:																
Flesh	....	....	....	....	....	....	....	....	1	1	1	....	....	....	....	....
Fracture	1	....	....	....	....	....	....	....	....	1	....	....	....	....	....	[1]1
Thorax:																
Nonpenetrating	1	....	....	....	....	....	....	....	....	1	1	....	....	....	....	....
Penetrating	....	....	....	1	....	....	....	....	....	1	....	....	1	....	....	....
Abdomen:																
Nonpenetrating	1	....	....	....	....	....	....	....	....	1	1	....	....	....	....	....
Penetrating	....	1	....	....	....	....	....	....	....	1	....	....	1	....	....	....
Shoulder, flesh	1	....	....	....	....	....	....	....	....	1	1	....	....	....	....	....
Arm, fracture	1	....	....	....	....	....	....	....	....	1	....	[2]1	....	....	....	....
Forearm, flesh	1	....	....	....	....	....	....	....	....	1	1	....	....	....	....	....
Fingers, fracture	2	....	....	....	....	....	....	....	....	2	[3]1	....	....	....	....	[4]1
Thigh, flesh	1	....	....	2	....	....	....	....	....	3	3	....	....	....	....	....
Knee joint	....	....	....	....	1	....	....	....	....	1	....	1	....	....	....	....
Leg, flesh	1	....	....	....	....	1	....	....	....	2	2	....	....	....	....	....
Tarsus and metatarsus, fracture	1	....	....	....	....	....	....	....	....	1	1	....	....	....	....	....
Total	11	1	....	3	1	1	....	....	1	18	12	2	2	....	....	2

VOLUNTEERS, 1900.

Head:																
Flesh	3	....	....	....	....	....	....	1	....	4	4	....	....	....	....	....
Fracture	4	....	....	....	....	....	....	....	....	4	1	1	1	[5]1	....	....
Neck	1	....	....	....	....	....	....	....	....	1	....	....	1	....	....	....
Thorax:																
Nonpenetrating	2	....	....	....	....	....	1	....	....	3	3	....	....	....	....	....
Penetrating	2	....	....	....	....	....	....	....	....	2	1	....	....	....	1	....
Abdomen:																
Nonpenetrating	....	....	....	1	....	....	....	....	....	1	1	....	....	....	....	....
Penetrating	1	....	....	....	....	....	....	....	....	1	....	....	1	....	....	....
Back and hip, flesh	6	....	....	1	....	....	....	....	....	7	6	....	....	1	....	....
Shoulder:																
Flesh	3	....	....	....	....	....	....	....	....	3	3	....	....	....	....	....
Joint	1	....	....	....	....	....	....	....	....	1	....	1	....	....	....	....
Arm, flesh	3	2	....	1	....	....	....	....	....	6	3	[6]3	....	....	....	....
Forearm:																
Flesh	4	1	....	3	....	....	....	....	....	8	8	....	....	....	....	....
Fracture	1	....	....	....	....	....	....	....	....	1	....	1	....	....	....	....
Hand, flesh	8	....	1	2	....	....	....	....	....	11	11	....	....	....	....	....
Carpus and metacarpus, fracture	2	....	....	....	....	....	....	....	....	2	1	1	....	....	....	....
Fingers, fracture	1	....	....	....	....	....	....	....	....	1	1	....	....	....	....	....
Thigh, flesh	1	....	1	4	....	....	....	....	....	6	5	....	....	....	1	....
Leg, flesh	1	....	....	1	....	1	....	....	....	3	3	....	....	....	....	....
Total	44	3	2	13	....	1	1	1	....	65	51	7	3	2	2	....

[1] Skull trephined. Remaining in hospital May 31, 1901.
[2] Arm amputated.
[3] Finger amputated.
[4] Remaining in hospital March 31, 1901.
[5] Pieces of bone removed.
[6] In one case, bulbous swelling on musculo-spiral nerve excised and nerve sutured. In another case, injured portion musculo-spiral nerve resected, ends sutured and ends of severed biceps muscle fastened and sutured. In another case, amputation at shoulder joint for gangrene, brachial artery having been severed.

Special surgical reports, rendered to June 30, 1901.

Name.	Rank.	Reports.
Baird, W. T	Contract surgeon	Adenitis, incision.
Banister, J. M	Major and surgeon	Report on the radical cure of varicocele.[1] Operations for the radical cure of hernia, 5 cases.
Block, W. H	Contract surgeon	Operations for the radical cure of hernia.
Borden, W. C	Major and surgeon	Operations for the radical cure of hernia, 41 cases. Report on the radical cure of varicocele.[1] Operations for the radical cure of hernia, enlisted men of the United States Navy. Popliteal aneurism.
Bradley, A. E	Captain and assistant surgeon.	Operations for the radical cure of hernia, 4 cases. Varicocele. Appendicitis. Tubercular testicle. Report on the radical cure of varicocele.[1]
Calhoun, Wm. H	Contract surgeon	Gunshot wound of chest, suicide.
Carling, John	First lieutenant and assistant surgeon.	Gunshot wound of head.
Carr, L. C	Major and surgeon volunteers.	Operation for the radical cure of hernia, 2 cases.
Corbusier, W. H	Major and surgeon	Appendicitis.
Darnall, C. R	First lieutenant and assistant surgeon.	Amœbic abscess of liver, 4 cases.[2] Gangrenous inflammation of Meckel's diverticulum.[2] Report of surgical operations hospital ship Relief.
DeMey, C. F	Contract surgeon	Incised wound of the neck, severe.
Fauntleroy, P. C	First lieutenant and assistant surgeon.	Operation for the radical cure of hernia. Abscess of liver.
Flagg, Charles E. B	Captain and assistant surgeon.	Amputation of the umbilical cord at the skin margin. Histories of cases operated on since June, 1900. Description of operation for hemorrhoids. Operation for varicocele, 3 cases. Report of surgical operations during year ending June 30, 1901.
Frick, E. B	do	Operation for the radical cure of hernia.
Girard, A. C	Lieutenant-colonel and deputy surgeon-general.	Report of surgical operations for period ending Apr. 30, 1900. Report of surgical operations, 27 cases. Report of surgical operations, September to December, 1900. Report on the radical cure of varicocele.[3] Report of surgical operations, Nov. 30, 1900, to Feb. 28, 1901. Operation for the radical cure of hernia. Report of surgical operations during March, April, and May, 1901.
Hallock, H. M	Captain and assistant surgeon.	Removal of abdominal tumor, fibro-sarcoma.
Howard, D. C	do	Septic arthritis, multiple incision and tube drainage. Operation for the radical cure of hernia, 2 cases. Rupture of spleen.[4] Operation for varicocele, 5 cases. Traumatic neuritis, neurectomy, and nerve suture.
Keefer, F. R	do	Drowning.
Kendall, W. P	Major and surgeon	Septicæmia.
Kennedy, J. S	Contract surgeon	Fracture of skull. Operation for the radical cure of hernia. Gunshot wound of chest.
Kilbourne, H. S	Major and surgeon	Laryngeal stenosis.
Leepere, Matthew	Contract surgeon	Prostatitis, cystitis, and urethral fistula.
Lyster, Theo. C	First lieutenant and assistant surgeon.	Lumbar abscess.
Metcalf, B. H	Contract surgeon	Abscess of lung.
Neff, Wallace	Major and surgeon volunteers.	Femoral aneurism.
Perley, H. O	Major and surgeon	Report of surgical operations on hospital ship Relief, Jan. 1 to May 31, 1900.
Phillips, John L	do	Intestinal obstruction, laparotomy.
Ramsey, George D	Contract surgeon	Gangrenous appendicitis.
Rhoads, T. L	do	Appendicitis.
Shimer, Ira A	First lieutenant and assistant surgeon.	Operation for the radical cure of hernia.
Stark, A. N	Captain and assistant surgeon.	Traumatic rupture, middle meningeal artery. Compound depressed fracture of skull. Strangulated femoral hernia. Operation for radical cure of hernia.
Stone, J. Hamilton	First lieutenant and assistant surgeon.	Perineal urethrotomy. Operation for the radical cure of hernia, 4 cases. Fistula in ano. Enucleation of eye.
Whittington, W. L	Contract surgeon	Gunshot wound of thigh, amputation.
Woodruff, C. E	Major and surgeon	Operation for the radical cure of hernia.

[1] Published in Circular No. 3, Surgeon-General's Office, 1901.
[2] Published in the New York Medical Journal, February 9, 1901.
[3] Published in Circular No. 3, Surgeon-General's Office, 1901.
[4] Published in the Philadelphia Medical Journal, March 11, 1901.

A report on the use of the Röntgen ray by the Medical Department of the United States Army in the war with Spain, prepared under my direction by Capt. W. C. Borden, assistant surgeon (now major and surgeon), United States Army, was received from the Government Printing Office in January, 1901, and has since been distributed. Experience with the use of the Röntgen ray apparatus leads Major Borden to the conclusions that its use in movable hospitals is not advisable and that it should be restricted to permanent base and general hospitals. His reasons for this are: First, that lodged bullets require immediate removal only in extremely rare instances; second, that the environment of and conditions incident to movable field hospitals render asepsis in operating practically impossible, and in consequence in field hospitals noninterference with wounds should be practiced to the utmost extent possible; third, that surgical interference with lodged bullets, except where adequate asepsis is available or the necessity urgent, is to be condemned, as the suppuration which follows is much more detrimental to the patient than the presence of the lodged missile; fourth, that a Röntgen ray apparatus in the field is an additional incentive to surgeons to operate under conditions not adequately aseptic. The report shows clearly that in noninfected wounds extensive comminution of bone is not as a rule an indication for operative intervention; that where there is infection, complete cleansing of the wound and removal of all loose bone fragments, followed by drainage, antiseptic dressings and irrigation, usually suffice, and that excision or amputation is to be resorted to only in extreme cases.

ABSTRACTS FROM THE RECORDS OF THE ARMY HOSPITAL SHIP RELIEF, SUBMITTED MARCH 12, 1901.

[Operations by First Lieut. Carl R. Darnall, assistant surgeon, United States Army.]

Amputation at elbow joint for osteomyelitis of radius and ulna, following amputation of forearm.—E. J. O., private, Company A, Twenty-eighth Infantry, United States Volunteers; age, 21; native of Pennsylvania; admitted to *Relief* June 11, 1900, from regimental hospital at Taal, Luzon, P. I. History: This man was wounded in left wrist on May 30, 1900, accidentally. The damage done was so great that the regimental medical officer amputated through the lower third of the forearm. The wound became infected, and when received on the *Relief* his temperature was high, ranging from 102° to 105° F., and his condition was bad. There was acute osteomyelitis of ulna and radius in the stump. I disarticulated at the elbow joint June 12, 1900. Recovery uneventful, union being primary.

Amputation of thigh for compound gunshot fracture of tibia and fibula.—H. G. D., private, Company M, Fourteenth United States Infantry; age, 34; native of Ireland; admitted to *Relief* September 4, 1900, from United States general hospital, Tientsin, China. History: On August 15, 1900, at Pekin, was wounded in left leg. Bullet entered at internal surface at junction of upper and middle third. It passed outward and backward, fracturing and badly comminuting tibia. Fibula also was fractured. The wound was infected when he was admitted to this ship, and pus had burrowed upward and downward between the muscles. An attempt was made to save the limb by opening up all the pockets and making counter openings in several places for through and through drainage. His condition remained fairly good, but there was very free discharge of pus. On November 13, thirteen weeks after the injury, I decided to amputate, as he was gradually growing weaker, and the ship being ordered to Manila it was thought advisable to perform the operation before returning to the Tropics. I made a long anterior and short posterior flap, dividing the femur above the condyles, as without this flaps of sufficient length could not be obtained. The wound healed by primary union, recovery being rapid and uneventful.

Amputation of thigh for tuberculosis of knee.—L. H. S., private, G, Sixth United States Artillery; age, 24; native of Indiana; admitted to *Relief* December 28, 1900, from post hospital at Cebu, P. I. History: On September 25 had an attack of acute pleurisy, right side. About October 18 an arthritis of left knee developed. The joint

became greatly swollen and tender and opened spontaneously about November 3. All the tissues became greatly thickened. The joint was completely disorganized, and the patient became much emaciated. He had hectic fever and night sweats. The limb both above and below the joint became riddled with sinuses. When admitted to the *Relief* his condition was extremely bad. He was a mere skeleton and had high fever every evening. A diagnosis of tubercular disease had been made. His lungs and other organs seemed unaffected, and on January 3, 1901, I amputated, dividing the bone at junction of upper and middle thirds of thigh. Shock was quite severe, but that having been overcome he had no further trouble. The wound healed by primary union, and on the twentieth day after operation his general condition was so much improved that he was able to be about on crutches. He rapidly regained his strength, and recovery is apparently complete.

Periostitis of femur.—G. B., private, Company C, First United States Infantry; age, 19; native of Pennsylvania; admitted to *Relief* December 7, 1900, from military hospital, Catbalogan, Samar, P. I. Diagnosis on transfer slip: Acute arthritis left knee. History: While on an expedition about October 15, 1900, he first noticed pain and stiffness on inner side of middle of left thigh. This extended downward to just above knee. This pain gradually increased and was worse at night. On admission to *Relief* he had a temperature of 98.8° in evening. There was pain and stiffness of knee and deep fusiform swelling involving middle third of thigh. This seemed to be connected with the bone. The knee joint was not swollen and appeared to be uninvolved. On December 17, 1900, I operated, making a long incision on outer surface of thigh over the deep swelling and discovered a condition of extensive periostitis. This was tubercular in character. After cleaning out thoroughly and making counter openings to procure free drainage the wounds were packed with gauze. At present, February 15, his condition is much improved, and the prospect for complete recovery is excellent.

Amœbic abscess of liver.—H. A. C., private, Company I, Sixth United States Infantry. Age, 21. Native of Kentucky. Admitted to *Relief* December 24, 1900, from United States hospital at Dumaguete, Negros, P. I. Diagnosis on transfer slip: Anæmia, acute. History: Had dysentery in 1899. Was in good health after this until September, 1900, when present trouble began. He first noticed pain just below costal border on right side, this radiated upward to the right shoulder. He had occasional attacks of nausea and vomiting. He had fever in evening and began to lose flesh. When admitted to the *Relief* his temperature was irregular, rising to 102° or 103° in evening, followed by sweats at night. The liver dullness was increased upward and downward. An exploratory puncture was made on December 27, and pus discovered in convexity of right lobe. I operated the same day by the transpleural method, removing 3 inches of ninth rib in axillary line. The diaphragmatic was stitched to the costal pleura. The liver was found to be not adherent to the diaphragm. A free opening was made into the abscess, which was situated about 1 inch below surface. Twelve hundred and fifty cubic centimeters of pus was evacuated. The anterior part of the wound through chest wall and diaphragm was closed, and a large drainage tube brought out of the posterior angle. The patient made an uneventful recovery. Discharge ceased one month after operation.

Operation for varicocele by the high method.—A. A. S., private, Company K, Fortieth Infantry, United States Volunteers. Age, 27. Native of Canada. This operation was performed December 27, 1900, at Cebu, P. I. An incision 1½ inches long was made over cord downward from the external ring. The veins were separated from the vas deferens and drawn out of the incision. Ligatures were placed about the veins above and below, and the portion of the vessels included between the ligatures (about 2 inches) was removed. The ends of the ligatures, which had been left long, were then tied together, thus lifting the testicle and shortening the cord. Stitches were inserted and a capillary drain used for twenty-four hours, after which the incision was sealed by collodion.

Operation for acute gangrenous appendicitis.—G. D. B., private, Company A, Thirtieth United States Volunteers. Age, 22. Native of Michigan. Admitted to *Relief* January 25, 1901, from United States hospital, Lucena, Luzon, P. I. History: This patient had an attack of pain in right iliac region, associated with fever and vomiting, about nine months ago. Since that time has been well until present attack. On January 24, 1901, was suddenly taken with pain in abdomen, gradually becoming localized in right iliac region. When admitted to the *Relief* he had a temperature of 99.4° F., occasional vomiting, and marked tenderness in right iliac region, and rigidity of right rectus. The pain was increased by extension of right thigh. Operation was performed January 26, by an oblique incision. There were numerous old adhesions, imbedded in which was the appendix in a state of gangrene. The parts were so firmly tied down that in order to get sufficient room the original incision was

extended. The appendix was ligated near its base and removed. Drainage by rubber tube and gauze was made. The patient took the anæsthetic very badly, and broncho-pneumonia set in on January 27. There was a considerable discharge of pus through the drainage tube for about a week, after which it gradually decreased in amount. The pneumonia, after several days, rapidly improved, and from this time recovery was uneventful.

Operation for the radical cure of hernia (Bassini's method).—C. B., private, Company C, Forty-fifth Infantry, United States Volunteers. Age, 24. Native of Indiana. Admitted to *Relief* January 29, 1901, from post hospital at Nueva Caceres, Luzon, P. I. The hernia in this case appeared about eight months ago. It was a complete, oblique inguinal hernia, left side. This operation presented no peculiar features. Kangaroo tendons used for deep sutures. Recovery uneventful. Union primary.

Operation for varicocele by the high method.—J. B. M., private, Company C, Forty-fifth Infantry, United States Volunteers. Age, 27. Native of District of Columbia. Admitted to *Relief* January 29, 1901, from post hospital, Nueva Caceres, Luzon, P. I. This case presented no peculiarities. Union was primary and recovery uneventful.

Suprapubic cystotomy for vesical calculus.—J. B., private, Company H, Forty-seventh Infantry, United States Volunteers. Age, 28. Native of Pennsylvania. Admitted to *Relief* January 27, 1901, from post hospital at Sorsogon, Luzon, P. I. History: In 1895 the patient first began to have trouble with his urinary apparatus. At that time he had to get up at night to pass water. He gives a history of renal colic. The active symptoms manifested themselves about a year ago. He had some pain in back and passed bloody urine at times. He has had increased frequency of micturition, stopping of the flow, pain after urination, etc. He was admitted to the *Relief* with a diagnosis of chronic cystitis. His urine was alkaline and foul smelling. On passing a sound a large stone was discovered. On February 7, 1901, I performed the suprapubic operation and removed a large calcium oxalate stone, which measured about 2¼ inches in its longest diameter, and in its shortest diameter about 1½ inches. It weighed 92 grams. Specimens of calcium oxalate stones of this size must be very rare; therefore I have sent this to the Army Medical Museum. The operation presented no unusual features except, of course, the large incision in the bladder for the removal of the stone. At present the patient is doing well and the cystitis is rapidly improving. The wound in the bladder is not sutured. Capillary drainage with gauze.

Operation for abscess of liver.—C. O'D., private, Company K, Fortieth Infantry, United States Volunteers. Age, 23. Native of Ireland. Admitted to *Relief* February 9, 1901, from United States hospital at Cagayan, Mindanao, P. I. Diagnosis on transfer slip: Acute hepatitis following dengue. History: This patient states that he was feeling well until February 4, 1901, at which time he was taken with nausea, vomiting, gradually increasing pain and tenderness in the epigastrium, and fever. When admitted he had a temperature of 102° F. in evening; pulse about 100; skin hot and dry; occasional vomiting. There was considerable dullness, and the patient's condition was very like the third week of a severe case of typhoid, with the exception of the pulse, which was below 100. There was a prominence of the epigastric region. I operated on February 10, making a median incision 2½ inches long through the abdominal wall just below the ensiform cartilage. On finding the liver adherent, I incised it and evacuated about 1,000 cubic centimeters of pus from the left lobe. Washed out cavity thoroughly and drained with two large tubes. The patient at present, February 16, is not doing very well. His temperature remains high, and signs of pyæmia are more marked. There are probably other collections of pus not yet discovered.

Notice: This patient died on February 28, 1901. Autopsy showed large abscesses of left lobe of liver, extending for a considerable distance into right lobe. The under surface of liver was adherent to anterior surface of stomach near pylorus. Spleen enlarged and softened. The other abdominal organs were apparently normal. Pericardium contained two ounces of clear straw-colored fluid. Both lungs were bound down to chest wall by old adhesions. Upper lobe of left lung was the site of numerous small abscesses.

Operation for radical cure of hernia (Bassini's method).—A. B. B., corporal, Company F, Thirty-first Infantry, United States Volunteers. Age, 23. Native of Ohio. Admitted to *Relief* February 8, 1901, from military hospital at Zamboanga, Mindanao, P. I. Operation February 11, 1901. This was a case of recent hernia. The operation presented no special features. Kangaroo tendon used for deep sutures. Union primary.

C. M. T., private, Company H, Thirty-first Infantry, United States Volunteers. Age, 30. Native of Kentucky. Operation February 11, 1901. This hernia was incurred in October, 1900. The neck of the sac was large. The operation presented nothing special. Kangaroo tendon used for deep sutures. Union primary.

Abstracts from the Records of the United States Army General Hospital, Presidio of San Francisco, Cal.

The following table of operations and results comprises the surgical work performed at this hospital during the past fiscal year. In addition to the usual records kept in such cases, a surgical report of each operation is forwarded to the Surgeon-General, and a complete clinical history, with a copy of the surgical report, is kept on file in this hospital. All of the operative work has been performed by the commanding officer of the hospital. A short review of the surgical work may be of interest.

Total number of surgical cases admitted to the ward during the fiscal year has been 372, divided as follows:

Regulars	187
Volunteers	153
Discharged soldiers	15
Civilians	17
Total	372

There have been 194 surgical operations performed by the commanding officer during the year, divided as follows:

Regulars	90
Volunteers	73
Discharged soldiers	14
Civilians	17
Total	194

The following is a tabulated list of the operations and results:

Operation and character.	Total.	Recovered.	Died.	Remarks.
Abscess:				
Hepatic	3	3		
Ischio-rectal	1	1		
Adenitis, nontubercular	1	1		
Appendicitis:				
Acute	1	1		
Recurrent	19	19		
Amputation:				
Right thigh	1	1		
Large toe, right	2	2		
Third finger, right	2	2		
Right leg, conical stump	1	1		Reamputation.
Left leg, upper third	1	1		
Aneurism:				
Popliteal	1	1		Result of gunshot wound left leg.
With varix, left temporal	1	1		
Cartilage displaced, right knee	1	1		
Contraction, palmar fascia	1	1		
Empyema:				
Sequel of gunshot wound	1	1		Wound received in 1877.
Sequel of pneumonia	7	6	1	
Enucleation, 2 of right eye and 1 of left eye	3	3		
Fistula in ano	5	5		
Fracture, simple faulty union	3	3		
Hernia:				
Inguinal	35	34	1	Cause of death, œdema and congestion of lungs. Patient had just completed an extended spree, which was not known.
Ventral	5	5		
Hemorrhoids:				
External	8	8		
Internal	4	4		
Internal and external	8	8		
Hydrocele, tapping and injection	1	1		
Hammer toe, tenotomy	1	1		
Intestinal adhesions, laparotomy	2	2		
Ingrowing nail, removal with matrix	5	5		
Laparotomy, exploratory	1	1		
Mastoiditis, trephining mastoid	2	2		
Nerve stretching; median nerve, right; sciatic nerve, left.	2	2		
Phimosis, circumcision	5	5		
Tumors:				
Lipoma	2	2		
Fibroid	1	1		

Operation and character.	Total.	Recovered.	Died.	Remarks.
Tumors:				
Cysts, sebaceous	1	1	.....	
Carcinoma of larynx	1	.....	1	Tracheotomy performed; died about three weeks later from broncho-pneumonia.
Varicocele:				
Left, single	30	30	.....	
Double	1	1	.....	
Wounds:				
Gunshot	16	16	.....	
Incised	1	1	.....	
Varicose veins, legs	4	4	.....	
Stricture, rectum	1	1	.....	
Tonsils, tonsilotomy for hypertrophy	1	1	.....	
Total	194	191	3	

ABSCESS OF THE LIVER.

Three operations for this condition were performed, all of which recovered. In no case was the amœba of dysentery found, and in two cases there was no evidence of the previous existence of dysentery. In one case, that of a recruit, the patient had never been out of the United States.

S. A., private, Battery L, Third Artillery.—Patient was admitted to this hospital on December 11, 1900, from the Philippine Islands, and was found to have a small fluctuating tumor upon the right side of the abdomen. This was only slightly tender and gave very little discomfort. He gave a history of having had malaria in the Philippine Islands, but said that he had never had dysentery or diarrhea. After a few days the tumor was found to be increasing slightly in size, and he had some rise of temperature in the evening. There was no jaundice or disturbance of the bowels.

Operation December 25, 1900: An incision was made over the most prominent part of the tumor in the abdominal wall just below the margin of the ribs. Quite a large amount of pus was found which was apparently confined to a localized area between the muscles. The discharge from the wound, however, was very profuse during the next few days, and while the wound was being dressed, about a week after the operation, a small sinus was found just below the margin of the ribs, leading beneath the abdominal wall. This was enlarged and found to communicate with a large abscess cavity involving the lower portion of the right lobe of the liver. This cavity was irrigated and drained, and the patient made a rapid recovery, being discharged on February 26, 1901, in good condition, the wound entirely healed.

E. J. O'N., private, Company K, Forty-second Volunteer Infantry.—The patient was admitted to this hospital on March 1, 1901, complaining of pain over the region of the liver and the lower portion of the right chest. This pain had been present since December, 1900. There was some evening temperature daily and a slight cough. Upon auscultation, the lower portion of the right chest was found flat and the voice and breathing sounds absent. He gave a history of having had dysentery in the Philippine Islands in July, 1900. Examination of the sputum for tubercle bacilli gave a negative result. An aspirating needle, introduced in the eighth interspace in the posterior axillary line, withdrew bloody pus.

Operation March 20, 1901: About 2 inches of the eighth rib was removed in the posterior axillary line. Immediately beneath this was found an abscess cavity about the size of a large orange, filled with thick bloody pus. This was shut off from the pleural cavity and extended along the diaphragm for some distance. It was thought that it communicated with the upper surface of the liver, although no opening could be found. The abscess cavity was irrigated and a drainage tube inserted. After the operation the wound healed readily and the patient was discharged from the hospital on April 22, 1901, with the wound entirely healed.

H. S., private, Twenty-eighth Company Coast Artillery.—Patient was admitted to this hospital on March 13, 1901, complaining of pain and tenderness over the right side of the abdomen. The patient was a recruit and had never been outside of the United States. He stated that these symptoms had been present for about a month. The bowels were constipated and there was an evening rise of temperature. He denied ever having had dysentery or other serious illness prior to the onset of the symptoms mentioned.

Operation March 22, 1901: An aspirating needle was introduced into the right side a little below the margin of the ribs, and revealed the presence of pus.

An incision was made through the abdominal wall at this point and a large abscess cavity opened, which extended upward beneath the lower surface of the liver and involved the right lobe. This cavity was irrigated and a drainage tube inserted.

Improvement was rapid after the operation and the patient was discharged from the hospital, the wound being entirely healed.

APPENDICITIS.

Nineteen operations for appendicitis were performed, recovery taking place in all the cases.

The technique of the operation has been somewhat modified by invaginating the stump of the appendix, the use of the gridiron incision, and the reduction in length of the skin incision, which in these cases has not been over three to four centimeters. The danger of hernia from this mode of operating is very much reduced and no case of such character has occurred.

The technique of the operation is improved by invaginating the stump of the appendix and covering in the invagination with a purse string suture of the bowel surrounding it. Further protection of the stump is obtained by a second suture surrounding the previous suture and about two-thirds of a centimeter beyond it. This double invagination, as it may be called, effectually walls off any secretion from the peritoneal cavity and reduces to a minimum the danger from sloughing of the appendicular stump.

The following case, that of Private J. A., is of especial interest. In this case the operation for appendicitis was performed about three weeks after an operation for the radical cure of hernia, which had been successfully performed at this hospital. Subsequent to the hernia operation the patient had experienced frequent attacks of pain in the right iliac region. He gave a history of having had these pains for several months at irregular intervals. The operation for appendicitis was performed in the usual manner, and the appendix removed. It was much swollen and congested and bound down by adhesions. Microscopical examination showed the typical appearances found in recurrent appendicitis.

About three weeks after the appendectomy he began to experience severe pain in the hypochondriac region of the right side. He had a slight rise of temperature daily, and gave a history of having fallen upon his right side in 1899, striking his body in the region in which the pain complained of was present. An exploratory operation was decided upon. On opening the abdomen, in the right semilunar line, many adhesions were found between the omentum and the transverse colon; the neighboring glands were much enlarged, and a portion of indurated tissue and several enlarged glands were removed. The liver and gall bladder appeared normal. For a few days his condition was somewhat improved, but the pains returned with greater intensity, and a well-marked tumor appeared beneath the wound. It was decided to open the abdomen in the line of the previous incision, which was accordingly done, and careful exploration discovered a hard indurated mass forming in the mesentery of the transverse colon. This mass was about the size of a small orange, and invaded the wall of the gut. The tumor was removed and about three inches of the transverse colon excised, the ends of the gut being united by a Murphy button. After the operation the wound closed readily and the patient improved rapidly, leaving the hospital in an apparently normal condition. Microscopical examination of the growth showed it to be of sarcomatous origin. At this date, six months after operation, no evidence of a recurrence of the growth has been observed.

ACUTE APPENDICITIS.

J. O'H., officer's son.—Patient was admitted to the hospital October 5, 1900. On admission there was moderate pain and well localized tenderness in the right iliac region. These symptoms had been present for ten days prior to admission. At the onset there had been some vomiting, several slight chills, and the bowels had been constipated. Patient gave a history of having had a similar attack six months before the present one. On the day following admission the temperature rose and his general condition appeared more serious.

Operation October 5, 1900: An incision was made through the abdominal wall at the outer side of the right rectus muscle, and a small localized abscess was found in the region of the appendix, shut off from the general abdominal cavity by adhesions. The appendix was found within this cavity in a gangrenous condition and ruptured. The appendix was removed, its stump cauterized, and the abscess cavity thoroughly washed out with salt solution. A drainage of iodoform gauze, surrounded by gutta-percha tissue, was left in the wound and the abdominal wall partly closed. No

unfavorable symptoms followed the operation. The wound healed by granulation and the patient made a good recovery, leaving the hospital November 6, 1900.

M. C., private, Battery H, Fourth Artillery.—Patient was admitted to hospital February 10, 1901, complaining of pain and tenderness in the right side of the abdomen. These symptoms, together with constipation, nausea, and vomiting, had been present for several days. On examination well localized tenderness was found in the right iliac region, with some rigidity of the abdominal muscles. Upon admission the temperature was 100.2° F. and a few hours later became 102.6° F.

Operation February 11, 1901: The usual gridiron incision was made near McBurney's point. The appendix was found in its normal position, much swollen and congested, with numerous fresh adhesions, while the peritoneum of the intestine in the vicinity was much inflamed. The appendix was removed without difficulty, ligated with catgut, the stump cauterized with carbolic acid, and the peritoneum sutured over the stump. Patient made a good recovery from the operation, and was returned to duty in April, 1901.

J. T. W., recruit, unassigned.—He was admitted to the hospital on May 7, 1901, complaining of pain in the lower portion of the right side of the abdomen. Upon examination a small tender tumor was found in the right iliac region, a little above Poupart's ligament. There was no particular tenderness over McBurney's point. He had a temperature of 101° F.; a pulse about normal and of good quality; the bowels were regular and there was no nausea or vomiting. He had suffered from pain in this region for three days before admission. He was kept under observation for several days, but no particular change occurred in the symptoms, except that the evening temperature went up to 103° and 104° F., and an operation was decided upon.

Operation May 14, 1901: An incision was made through the abdominal wall over the tumor, a little above Poupart's ligament. A large abscess cavity was found extending well down into the iliac fossa. A large amount of pus was evacuated, together with some broken-down necrotic tissue. The appendix could not be found. The abscess cavity was localized and entirely shut off from the abdominal cavity. Patient made a good recovery from the operation.

RECURRENT APPENDICITIS.

J. D. C., private, Company H, Sixteenth United States Infantry.—Patient was admitted to this hospital on January 7, 1901, from the Philippine Islands. He gave a history of having had several attacks of appendicitis, the first in May, 1900. During each attack there had been abdominal pain and tenderness localized in the right iliac region, a moderate rise of temperature, and some nausea.

On admission there was slight tenderness in the region of the appendix, which he said had been present for several months. The bowels were regular. Five days after admission there was a slight attack of pain in the right iliac region with a rise of temperature to 99° F.

Operation January 14, 1901: An incision was made through the abdominal wall near McBurney's point, the muscle fibers being separated longitudinally, making the gridiron opening. The incision, as in all such cases in this hospital, was about 3 centimeters in length, while the opening through the fascia of the external oblique was made a little longer. This gives an increased working space, owing to the elasticity of the skin. The appendix was found in its normal condition and free from adhesions. It was, however, unusually long, much congested, and contained a fecal concretion about the size of a pea. It was removed in the following manner: First the mesentery was ligated with catgut and the appendix freed to its base; next a circular incision was made through the peritoneal covering about 1 centimeter from its base and this portion turned back toward the cæcum, forming a cuff. The appendix was then ligated with medium-sized catgut, close to the intestine, excised, and the stump cauterized with pure carbolic acid. The cuff of peritoneum was sutured over the stump with fine silk, forming a complete covering.

The abdominal cavity was then closed in the usual manner, catgut sutures being used for the peritoneum and each layer of fascia, and a subcuticular silkworm gut suture for the skin. Patient made a good recovery, the wound closing by primary union, the sutures being removed on the eighth day.

P. C. C., private hospital corps, United States Army.—Patient was admitted to the hospital on February 1, 1901, and gave a history of having had several attacks of appendicitis. These attacks were characterized by well-localized pain in the right iliac region, some fever, nausea, and constipation. The last attack was in the Philippine Islands in January, 1900, and since that time, while there have been no definite attacks, he has always had a little tenderness in the region of the appendix. Upon admission there was some tenderness in this region and slight rigidity of the abdominal muscles.

Operation February 4, 1901: The usual gridiron incision was made through the abdominal wall near McBurney's point and the appendix found in its normal position. It was surrounded by many old, dense adhesions and the tip of it was very firmly adherent to the margin of the pelvis. It was removed, however, without difficulty, the stump was cauterized with pure carbolic acid and covered over with peritoneum. The abdominal wall was closed in the usual manner, catgut for the buried sutures and a subcuticular silkworm-gut suture for the skin. The wound healed without complications, and the patient was returned to duty March 5, 1901.

F. S., private hospital corps, United States Army.—Patient was admitted to the hospital February 13, 1901, and gave a history of having had a fall while carrying a litter in the Philippines in April, 1899. Since that time he has had frequent attacks of pain in the region of the appendix, these attacks coming on at intervals of a few months. Recently the attacks have become more severe, and have been attended with nausea and vomiting, constipation of the bowels, and well-marked localized tenderness. On admission his temperature was normal, but there was localized tenderness and rigidity of the abdominal muscles in the right iliac region.

Operation February 19, 1901: An incision was made through the abdominal wall a little to the right of the rectus muscle, near McBurney's point. The peritoneum of the abdominal wall was found much congested and œdematous, and upon carrying the incision through this a small abscess cavity was found close to the abdominal wall, and shut off from the general abdominal cavity by dense adhesions. The appendix was found in the midst of this cavity, ulcerated through, near its base. It was removed and the cavity irrigated; the abdominal wall was partially closed, a drainage being left consisting of strips of iodoform gauze surrounded with gutta-percha tissue. The patient made a good recovery without complications, the wound healing readily by granulation.

Mrs. K.—Patient was admitted to hospital on March 5, 1901, with a history of having had several attacks of appendicitis extending over a period of about two years. Since January, 1901, there have been constant pain and tenderness in the right side of the abdomen, some fever at times, marked disturbance of digestion, and constipation of the bowels. Upon examination, well-marked tenderness was found in the region of the appendix, also rigidity of abdominal muscles of the right side.

Operation March 6, 1901: An incision was made through the abdominal wall a little to the right of the rectus muscle. The fascia and muscle were separated longitudinally making the gridiron incision. The appendix was found much enlarged and congested and bound down by numerous old and recent adhesions. It was liberated and removed and found to contain large fæcal concretions. The stump was cauterized with pure carbolic acid and invaginated into the wall of the colon. The wound was then closed in the usual manner and the patient made a good recovery without complications.

S. A. H., musician, Company G, Thirty-ninth United States Volunteer Infantry.—Patient was admitted to this hospital July 21, 1900, convalescent from malaria and typhoid fever, which he had contracted in the Philippine Islands. Since January, 1900, he has had several attacks of pain in the right iliac region with marked abdominal tenderness and constipation. There was no nausea or vomiting, but a slight rise of temperature.

Operation August 13, 1900: An incision was made through the abdominal wall to the outer side of the right rectus muscle, the muscular fibers being separated longitudinally making the gridiron incision. The appendix was found in its usual position surrounded by many adhesions and much swollen and congested at the extremity. It was removed without difficulty and the peritoneum sutured over the stump. The abdominal wall was closed in the usual manner and the patient made an uninterrupted recovery.

CHRONIC PERITONITIS WITH INTESTINAL ADHESIONS.

H. D. B., private, Company K, Fourth Infantry.—The patient was admitted to the hospital on September 23, 1900, from the Philippine Islands. He gave a history of having had, for several months, frequent attacks of pain in the right iliac region, accompanied by moderate abdominal tenderness; but there was no fever or vomiting with the attacks. After being kept under observation for some time, it was thought that the patient was suffering from chronic appendicitis and an operation was performed and the appendix removed on October 18, 1900. The appendix was found somewhat congested and bound down by numerous adhesions. It was removed in the usual manner, the adhesions broken up, and the patient made a good recovery. About three weeks after the operation the pain returned, at which times there was knotting of the intestines in the right iliac region from the accumulation of gas, and it was decided to reopen the wound and relieve the adhesions.

Operation December 1, 1900: An incision was made through the cicatrix of the former wound in the abdominal wall. Many recent adhesions were found about the lower end of the ileum and the cæcum matting the intestines rather firmly together, and scattered over the peritoneum of this region were numerous small deposits which looked like miliary tubercles. The adhesions were broken up, the intestines liberated, and the abdominal wall closed layer by layer, catgut being used for buried sutures and silkworm gut for the skin. The wound healed without complication and for a time the patient's condition was improved, but the attacks of pain soon returned, although his general condition became fairly good. He was discharged on surgeon's certificate of disability January 17, 1901.

ANEURISM, CIRSOID.

R. C. B., private, Company I, Twenty-fifth United States Infantry.—Patient was admitted to hospital September 23, 1900, suffering from a cirsoid aneurism of the temporal artery anterior to the left ear. He gave a history of a fall in the Philippine Islands in December, 1899, striking on the left side of his face, and about a month later noticed an enlargement and pulsation of the artery in front of the left ear.

Operation September 29, 1900: The dilatation of the vessel extended along the side of the face anterior to the left ear for about one inch and a half, and this portion of the vessel was removed after numerous ligations of the temporal artery and its branches. Considerable bleeding was encountered at the operation, but it was easily controlled. The wound healed rapidly, and there has been no recurrence of the condition.

EMPYEMA.

Eight cases of this character were operated upon by resection of a portion of one or more ribs, and all recovered save one. This case was so extremely debilitated on admission to the hospital from malarial fever and dysentery, contracted in the Philippines, that when he subsequently developed pneumonia of the left lung, followed by empyema, there was very little hope of his recovery, and although the operation was performed as rapidly as possible, his already weakened condition militated against the normal reaction, and he died in forty-eight hours from exhaustion.

The following cases illustrate the conditions present in these operations:

H. R., retired soldier.—Had been shot in the right chest in 1877, and since that time had had occasional pain in the right scapular region, posteriorly. The physical examination of the chest revealed marked flatness over the middle line posteriorly of the right side, and a few inches below the lower border of the scapula. An aspirating needle introduced between the sixth and seventh ribs revealed the presence of pus. He was operated upon, and 1½ inches of the sixth and seventh ribs were removed in the anterior axillary line. The pleura was found much thickened and adherent to the chest wall. Upon incising this an abscess cavity the size of a large orange was discovered, the wall of which was covered with a thick calcareous deposit. The cavity was washed out, a large portion of the calcareous lining removed, and a drainage tube left in the wound. The patient's condition improved very rapidly and the cavity contracted to a small sinus. A slight discharge still came from the sinus when the patient left the hospital, but he was otherwise well.

A. E. A., musician, Company A, Forty-sixth United States Volunteer Infantry.—The patient was admitted to the hospital on May 18, 1901, from the transport *Sheridan*, with a pneumonia of the lower lobe of the left lung, which had been present since May 14. On admission his temperature was 102° to 104° F., and during the next ten days it fluctuated between 98° and 104° F. His pulse was rapid, generally about 120. On May 30 the diagnosis of empyema was made, and an aspirating needle introduced into the fifth intercostal space in the anterior axillary line revealed the presence of pus.

Operation May 30, 1901: A portion of the fifth rib was removed in the anterior axillary line, the pleural cavity opened, and a large amount of pus evacuated. The cavity was irrigated with a weak solution of lysol and a drainage tube inserted. The wound healed without complications, the patient making an uninterrupted recovery.

J. B., private, Company D, Thirtieth United States Volunteer Infantry.—Patient was admitted to the hospital on April 12, 1901, with measles. A few days after admission he developed pneumonia of the lower lobe of the right lung. On May 9 there were signs of fluid in the right pleural cavity, and an aspirating needle introduced in the seventh interspace showed the presence of pus.

Operation May 11, 1901: About 1½ inches of the seventh rib was removed in the posterior axillary line; the pleural cavity was opened and a large amount of pus evacuated. The cavity was irrigated with a weak lysol solution, and a drainage tube

inserted. At the time of the operation the patient was in a very poor condition, but he soon began to improve; the lung expanded, the abscess cavity became reduced in size, and he was discharged from the hospital cured.

GUNSHOT WOUNDS.

Sixteen operations were performed during the year upon cases suffering from gunshot wounds. The character of the operations will be seen from the following illustrative cases:

H. O. R., quartermaster's employee.—The patient was admitted to this hospital August 4, 1900, suffering from pain and weakness in the region of the left hip joint, the result of gunshot wound received in the Philippines March 1, 1900, when he was in the employ of the Quartermaster's Department, United States Army. The bullet struck the left side of his cartridge belt, exploding two shells, and all three bullets entered the outer side of the left hip. Examination by the X-ray revealed the presence of a foreign body just above the capsule of the hip joint.

Operation August 9, 1900: An incision was made in the left gluteal region and the fibers of the muscles were separated longitudinally. The bullets were found in the position indicated by the radiograph just above the capsule of the hip joint, and were easily removed from that position. The wound was then irrigated and closed in the usual manner. It healed by primary union and the patient made a perfect recovery, being discharged from the hospital on September 25, 1900, with the functions of the joint practically restored to their normal condition.

F. H., private, Company K, Fourth Infantry.—The patient was admitted to this hospital April 3, 1900, suffering from gastro-enteritis. He also had a bullet in the left side, the result of a gunshot wound received in the Philippine Islands. The bullet entered the outer aspect of the left thigh near the middle with no wound of exit. A careful examination with the X-ray showed the bullet to be located near the middle of the thigh close to the outer side of the femur.

Operation August 22, 1900: An incision was made through the scar left by the wound of entrance, but this failed to locate the bullet and another incision was made on the posterior aspect of the thigh, and through this the bullet was easily removed. The wounds healed readily, and the patient was discharged on October 19, 1900.

G. E. G., captain, Thirty-fourth United States Volunteer Infantry.—The patient was admitted to the hospital September 24, 1900, suffering from the effects of a gunshot wound of the left side of the lower jaw and of the right shoulder, which had been received in action in the Philippines on July 22, 1900. On admission to this hospital there was a sinus leading down to the lower jaw near the angle, from which there was a moderate discharge. There was also a sinus through the spine of the right scapula, the upper opening being a little behind the clavicle and the lower one a little below the middle of the scapula. The patient's general condition improved, but the sinuses remained with a moderate amount of discharge, evidently due to the presence of necrosed bone.

Operation October 28, 1900: The sinuses were enlarged and several pieces of necrosed bone removed, both from the angle of the jaw and from the shoulder. The wounds were then thoroughly curetted and packed with iodoform gauze. After this operation, the wound in the shoulder healed rapidly and was entirely closed at the end of four weeks. The wound at the angle of the jaw partially healed, but a small sinus remained, apparently caused by discharge from the parotid gland, the duct of which had been cut at the time of the injury.

F. R. L., second lieutenant, Ninth United States Infantry.—The patient was admitted to the hospital October 19, 1900, suffering from the effects of a gunshot wound received in action in China July 13, 1900. There was paralysis of the right arm, and considerable pain in this arm and right shoulder. Examination with the X-ray revealed the presence of a bullet in the right side of the neck which had entered near the middle of the right scapula.

Operation October 24, 1900: After the patient was anæsthetized the bullet could easily be felt at the base of the right side of the neck, near the transverse process of the sixth cervical vertebra. It was removed from this position without much difficulty through a small incision. The wound healed readily by primary union, no complications resulting. After operation the condition of the arm improved somewhat, but its function was not fully restored.

J. S., private, Company M, Fourteenth Infantry.—The patient was admitted to the hospital October 19, 1900, with paralysis of the left forearm and hand, the result of a gunshot wound received in action in China on August 6, 1900, through the upper part of the left arm. There was complete paralysis of the muscles supplied by the musculospiral nerve.

Operation November 13, 1900: An incision was made on the outer aspect of the arm over the musculospiral groove down to the nerve, in order to see if this had been severed at the time of the wound. The nerve was found intact, but compressed by the callus which was thrown out from the fractured end of the bone. It was liberated from this position and raised up into the soft tissues and the wound was then closed. The wound healed readily after the operation, but the condition of the forearm and hand remained practically the same. The patient was discharged on surgeon's certificate of disability.

A. C., private, Company D, Thirty-ninth United States Volunteer Infantry.—Patient was admitted to the hospital on February 3, 1901, suffering from partial paralysis of the right hand and constant pain in the palm of the hand, the thumb and fingers supplied by the median nerve, the result of a gunshot wound received in the Philippines in September, 1900, the bullet passing through the lower third of the right arm, shattering the humerus. The most important symptom for which the operation was performed was the excessive pain from which the patient suffered almost continually.

Operation February 10, 1901: An incision was made just above the elbow, over the line of the median nerve. The nerve was found surrounded by dense cicatricial tissue. In the lower portion of the wound two pieces of the jacket of the bullet were found pressing upon the nerve and partially embedded in the substance. These were removed and the nerve freed from adhesions. Almost immediately after the operation the pain disappeared. The wound healed rapidly and the condition of the patient was very much improved. He was discharged from the hospital February 20, 1901.

VENTRAL HERNIA.

Five cases of ventral hernia were operated upon during the year, all of which were the result of operation or injuries in the Philippine Islands. The results obtained after operation in this hospital were very satisfactory. The two following cases will show the character of these operations:

E. M., private, Company M, Twenty-ninth United States Volunteer Infantry.— Patient was admitted to the hospital February 3, 1901. He had a moderate-sized ventral hernia, which was the result of an operation for appendicitis performed in the Philippines in February, 1900.

Operation February 13, 1901: The old cicatricial tissue of the skin and fascia was removed and the incision extended through the abdominal wall. The peritoneum was found much retracted, with the omentum adherent to its edges. These adhesions were broken up and the wound closed after the manner of a fresh incision by suturing the peritoneum and the different layers of fascia separately. The skin was closed with a sub-cuticular silkworm gut suture. Patient made a good recovery, and left the hospital March 19, 1901.

T. S., discharged soldier.—Patient was admitted to the hospital on January 7, 1901, and was found to have a small ventral hernia in the right iliac region, which followed an operation for appendicitis performed in the Philippine Islands.

Operation January 9, 1901: The cicatrix of the old wound was excised and an incision made through the abdominal wall over the hernia. In the lower portion of the wound the abdominal wall was very much thinned out by separation of the muscles and fascia so that the hernia projected close to the skin. The different layers of the abdominal wall were isolated as far as possible, and the wound closed after the manner of a fresh incision, each layer, including the peritoneum, being sutured separately. Catgut was used for the buried sutures and silkworm gut for the skin. The wound closed by primary union and a good result was obtained.

INGUINAL HERNIA.

Thirty-five cases of inguinal hernia were operated upon, of which 34 recovered with good results and 1 died. This patient was a discharged soldier who had suffered much from illness in the Philippines, and whose general condition was very poor owing to prolonged dissipation since his return from the Orient. These facts were not known at the time of the operation. He took the anæsthetic very badly and died of congestion and œdema of the lungs.

The usual Bassini operation was performed in these cases, and the material found most suitable for sutures was catgut for the buried sutures and silkworm gut for the skin sutures, by the subcuticular method.

The following cases illustrate the character of these operations:

J. A. J., sergeant, Company I, Thirty-fifth Infantry, United States Volunteers.—Patient was admitted to the hospital July 28, 1900, with a moderate-sized indirect inguinal hernia of the right side, the result of a fall in January, 1900, in the Philippines.

Operation August 8, 1900: The usual Bassini operation was performed in this case. The operation was rendered more difficult on account of firm adhesions between the sac and the scrotal tissues. The omentum was also closely adherent to the wall of the sac. The sac protruded on both sides of the epigastic vessels, forming both a direct and indirect hernia. The sac, however, was reduced without much difficulty and ligated external to the epigastric vessels, and the wound closed in the usual manner. Patient made an uninterrupted recovery.

R. V. S., M. D.—The patient was admitted to the hospital July 26, 1900, with a moderate-sized, indirect inguinal hernia on the left side, which had been present for about eighteen months.

Operation July 28, 1900: The Bassini operation was performed, but was rendered more difficult than usual on account of a very thick abdominal wall. The internal ring was also very large. In this case the internal ring was closed with sutures of chromicized catgut. Ordinary catgut was used for the superficial buried sutures and the wound closed in the usual manner. At the end of six days after the operation there was a slight rise in temperature and a small accumulation of purulent fluid in the lower portion of the wound. This was drained out and the wound irrigated and packed with iodoform gauze. No other complications followed and the patient made good recovery.

E. S., chief trumpeter, Third Artillery band.—The patient was admitted to the hospital on May 22, 1901, with an indirect inguinal hernia of the left side. The hernia was small and was a recurrence after an operation on this side, two and a half years ago.

Operation May 25, 1901: The regular Bassini operation was performed, but was rendered a little more difficult than usual on account of some old scar tissue from the previous operation. The operation was concluded in the usual manner, the wound healed by primary union with excellent results.

J. L., private, Company A, Twenty-first Infantry.—Patient was admitted to this hospital October 19, 1900, from the Philippines. He had a moderate-sized direct inguinal hernia in the left groin, the result of a fall in May, 1900. He was suffering from the effects of chronic dysentery and malaria, on his admission here, and was kept under treatment for these conditions for some time before it was thought best to operate.

Operation December 12, 1900: The usual Bassini operation was performed and the hernia sac was found to be small and protruded internal to the deep epigastric vessels, making a direct inguinal hernia. No complication arose during the operation and it was completed in the usual manner with catgut for the buried sutures and a sub-cuticular silkworm gut suture for the skin. The wound healed by primary union and the patient was sent to duty in good condition on January 20, 1901.

INTERNAL AND EXTERNAL HEMORRHOIDS.

Twenty operations for hemorrhoids were performed during the year, of which 8 were for external hemorrhoids, 4 for internal hemorrhoids, and 8 for combined external and internal hemorrhoids. The method of operation was by ligation, the tumors being held by a clamp, the skin and mucous membrane incised about their base, then ligated with silk and removed. The following case is illustrative of all these operations:

M. P. W., private, Company C, Thirty-third Infantry, United States Volunteers.—Patient was admitted to this hospital January 7, 1901, suffering from rather large hemorrhoids, which were found to be both internal and external to the sphincter. He had suffered from chronic diarrhea in the Philippine Islands and had noticed the hemorrhoids for several months.

Operation January 17, 1901: The tumors were held by a clamp and the skin and mucous membrane incised at their base when they were ligated with silk and removed. At the conclusion of the operation a small glass tube wound with strips of iodoform gauze was inserted in the rectum just through the sphincter so as to enable the patient to pass gas without difficulty. The bowels were moved after five days and a good result was obtained from the operation. He was discharged from the hospital on February 5, 1901.

NERVE STRETCHING.

Two operations of this character were performed, in one case the median nerve and in the other the sciatic nerve being stretched. The conditions present were such that a partial paralysis existed in the extremity, this condition resulting in both cases from gunshot wounds affecting the nerve. Slight improvement was shown in both cases, but full restoration of function did not occur.

VARICOCELE.

Thirty-one cases of this condition were operated upon by the suprapubic method, reported upon in Circular No. 3, S. G. O., February 27, 1901. This operation gives the most successful results, especially in the avoidance of sepsis and in maintaining the circulation by retention of a sound vein of the plexus. For further safety, after the veins are ligated, the ends of the ligatures are anchored to the external ring. The deep and superficial fasciæ are then carefully separated and united by continuous catgut suture and the skin by a subcuticular suture of silkworm gut.

The following case is inserted as an illustration of the general character of these operations:

F. F., private, Company H, Fourteenth Infantry.—The patient was admitted to this hospital October 19, 1900, convalescent from chronic diarrhœa and heat prostration which occurred in China in 1900. He presented a moderate-sized varicocele of the left side which he first noticed in December, 1899.

Operation November 12, 1900: The usual operation for varicocele was performed, a small suprapubic incision being made and a portion of the enlarged vein excised. The ends of the vessels were joined together with catgut and the ligatures anchored to the external ring. The wound was closed with catgut for the deep sutures and silkworm gut, by the sub-cuticular method, for the skin. The patient made a good recovery from the operation, although convalescence was somewhat retarded by frequent attacks of severe headache, evidently a sequel of the heat-stroke above mentioned.

GUNSHOT WOUND OF BRAIN, REPORTED BY J. CARLING, LIEUTENANT AND ASSISTANT SURGEON, THIRTY-FIFTH INFANTRY, UNITED STATES VOLUNTEERS, NOVEMBER 14, 1900.

I have the honor to report the following interesting case of penetrating gunshot wound of head: The patient, a Filipino boy, age 16, was wounded by a .30-caliber Krag-Jörgensen bullet during an attack by insurgents on the town of San Miguel de Mayumo, Luzon, P. I., on the night of October 13, 1900. The patient was admitted to hospital one hour after receipt of injury with complete hemiplegia, left side. Temperature was 100, pulse slow and full, respiration normal. There was some nausea and vomiting and retention of urine. Pupils were dilated; special senses were not affected, but there was some loss of sensation on paralyzed side. Consciousness was retained, patient being very restless and talkative. Inspection showed the entrance of bullet on right side of head directly over the posterior border of the fissure of Rolando, 1¼ inches to right of median line. The wound was circular in shape, half an inch in diameter, and filled with clotted blood, hair, and débris. There was no wound of exit. The wound was irrigated with a solution of bichloride of mercury 1 to 2,000, foreign particles removed, and antiseptic dressing applied. On the following morning the patient's temperature was 101° F., and, as his general condition was otherwise unchanged, the operation of trephining was performed, assisted by Contract Surg. E. N. Bowen. After thoroughly shaving and cleansing the head, the patient was placed under chloroform anæsthetic and crucial incision made in scalp, extending an inch on either side of wound. When the flaps were retracted, a circular hole was revealed in the skull, one-third of an inch in diameter, with roughened and depressed margins, and beneath the torn dura were clots of blood, loose hairs, small fragments of bone, and broken-down brain tissue. The inner table also was found to be splintered. In order to obtain better access to the injured brain, with a view to removing the foreign bodies embedded therein, the trephine was used, and two buttons of bone, each one-quarter of an inch in diameter, were cut out on either side, while the elevator and rongeur forceps were used to elevate and trim the rough margins. Fifteen pieces of bone in all were removed, some being embedded in the brain half an inch beneath the dura. An attempt was then made to locate the bullet. By means of a blunt probe of soft metal its course was followed a distance of 4 inches in a direction downward and backward at an angle of 45°, after which it was lost. Deeming further probing dangerous to the life of the patient, the wound was thoroughly irrigated with a warm solution of boracic acid, packed with iodoform gauze, and the scalp sutured with interrupted sutures of silk, leaving a small opening below for drainage. On the day following operation the patient's condition greatly improved. He complained of very little pain and was less talkative and restless. The nausea and vomiting had ceased and he had full control over urine, but there was no change on the paralyzed side. His temperature was 99.5° F.; pulse, 80; respiration, 20. On October 17, forty-eight hours after operation, his temperature reached normal, and remained so until the end of his convalescence. On Octo-

ber 23 patient was able to move toes and ankle on paralyzed side. On October 28 he was able to raise the entire left lower extremity from bed and was slowly regaining power in upper extremity. As the paralysis cleared up normal sensation returned, and at time of making this report the patient has almost entirely recovered from the paralysis with a clean wound and a sound body. The wound in head, having been frequently dressed, healed by granulation from side to bottom, leaving only a slight scar to mark the entrance of bullet. The latter is now undoubtedly becoming encapsulated at the base of brain, and it will be interesting to know if ill results follow.

With this end in view, the patient will be kept under observation as long as possible and report made later if anything develops. * * *

SUPPLEMENTARY REPORT DATED MARCH 1, 1901.

I have the honor to present the following supplementary report of a case of gunshot wound of head, the original report covering operation having been made under date of November 14, 1900, a copy of which is herewith attached. As the patient is about to pass from under my observation it may prove interesting to note his present condition. Nearly five months have now elapsed since receipt of injury, during which time the patient has steadily improved. His mind is perfectly clear, sight, hearing, taste, and smell normal, and common sensation on hemiplegic side is not affected. The hemiplegia (left) has almost entirely disappeared, the only disability remaining being slight ankle-drop which is scarcely perceptible. Patient now attends school regularly, and is considered by his teacher the most promising pupil in his class. He has an excellent voice, and the injury to head and resulting operation has in no way affected it, so that he is again able to resume his place in church choir. The progress therefore in this case is excellent, and the occurrence of sequelæ in later years is, in my opinion, very unlikely.

SPECIAL REPORT OF CASES OF FROSTBITE ADMITTED TO HOSPITAL AT FORT ST. MICHEAL, ALASKA, MARCH 2, 1901, BY R. G. EBERT, MAJOR AND SURGEON, UNITED STATES ARMY.

James McNeill, miner, American, 49; John Callaghan, laborer, Irishman, 30, and Frank Madden, sailor, American, 34, were frozen by being imprisoned in a tent by snowdrifts, without fire or means of making same, on the trail to the Kuskokwim country while on a "stampede," 230 miles from St. Michael and 10 miles from the nearest native village, during a storm which raged over northwestern Alaska, January 20 to 28, 1901. Their cases were reported to military authorities at St. Michael on February 24, and a relief party sent out the following day, which brought them in, after a seven days' trip by dog teams, on March 2.

When they arrived at this hospital McNeill and Callaghan had both hands and Madden both feet frozen. Gangrenous odor very marked; extreme exhaustion from starvation (having lived on short rations of native food, dried salmon, etc., for twenty-nine days), exposure to climatic conditions, results of injuries, and lack of attention. While lying at this village they were unable to help themselves, and the natives showed great aversion to them and were reluctant to render the most trifling assistance.

Upon arrival here their wounds were cleansed and dressed, but owing to their exhausted condition no operative measures were taken until March 4, when McNeill, the strongest, was put on the table. All proximal phalanges and distal ends of first, third, and fifth metacarpal bones of right hand were denuded, soft structures beyond mummified with granulations and gangrenous tissues above points of denudation. The condition of the left hand was similar to that of the right, the points of denudation being the distal ends of first and fourth metacarpal bones, distal ends of second and third proximal phalanges, and fifth proximal phalanx. Right wrist also frozen, styloid process diseased, gangrenous slough about 2 inches in diameter directly over it; to a less degree this was also the condition of the left wrist. The index and ring fingers were disarticulated at the knuckle; distal ends of first, third, and fifth metacarpal bones had to be removed before sufficient tissue could be obtained to cover them. The styloid process was chiseled away and gangrenous tissue thoroughly curetted. Subsequently, on several different occasions skin-grafting was performed on the granulating surface with gratifying results. Constant cardiac stimulation was necessary throughout the operation. This condition precluded further operative procedures. March 9 the diseased tissues of left hand were removed in the following manner: Thumb amputated at distal end of metacarpal bone, index and middle fingers at distal third of proximal phalanges, and ring and little finger at metacarpo-phalangeal joints.

Tissues forming the flap over the distal end of fourth metacarpal failed to unite and required a secondary operation on April 6. Everything which showed the least signs of vitality was left at the time of operations. This necessitated a third appearance on the table, but, with the exception of the two phalangeal stumps on left hand, nothing of value could be saved. Wounds were entirely healed on May 10.

Callaghan's condition was as follows: Nervous prostration (constant tremors awake and sleeping) prevented operating prior to March 6. Line of amputation was approximately as follows: Distal third proximal phalanx of thumb, index finger at metacarpo-phalangeal joint, head of metacarpal bone of middle finger, distal third of fourth and middle of fifth metacarpal bones. A line, including a somewhat greater amount of structure, will define the points of operation on the left hand. Amputations on both hands were simultaneous, Dr. L. T. Mitchell operating on the left. Erysipelas developed in the left stump March 9. The patient was promptly isolated and all precautions used to prevent contagion. Two days after their inception the symptoms subsided. The flaps failing to unite, granulating surfaces were stimulated by grafts and cicatrization occurred in a surprisingly short period. Both stumps have been completely healed for six weeks and the man is able, with the remainder of his thumbs, using them against the second metacarpals, to perform all minor offices for himself.

Madden was in a wasted and anæmic condition. Excepting the feet, nothing but the left wrist was frozen. The right foot was a mass of diseased and denuded bone and gangrenous tissue. The destructive process was not so extensive in the left foot, the tarsal bones, with the exception of the posterior fourth of the calcaneum, not being involved and the line of demarcation being drawn through the proximal third of the metatarsal bones. On March 8 an attempt was made to operate, but before complete anæsthesia could be obtained his condition became so feeble that the operation was postponed. Under continued tonic treatment and stimulation amputation of right foot 3 inches above the ankle joint by antero-posterior flap was performed with complete union in two weeks. Owing to manifestations of malaria ("Chagres fever," contracted in 1896) operation on left foot had to be postponed until April 10, when amputation through the upper third of the metatarsals and removal of the posterior fourth of the os calcis was performed. Diseased soft structures of heel were so extensive that in after treatment recourse was had to frequent skin grafts. Union here was slow but complete on May 20.

As it was desired to save as much as possible of the hands and feet, operations were performed through tissues which had been frostbitten, and in no instance, except in Madden's right limb, was there immediate union, and with only this exception the operations were necessarily not aseptic.

Ether was the anæsthetic used, being administered by Hosp. Steward John L. Henderson. Acting Hosp. Steward Alexander T. MacPherson was the able assistant in all operations. To both much credit must be given for the success obtained. The nursing of these men by the members of the hospital corps at this post under the charge of Acting Steward MacPherson has proved a severe and arduous addition to their duties. It was cheerfully performed and is worthy of high praise.

Report of Observations on the Organization and Service of the Medical Department of the German Army Made during July, 1901, by Capt. John S. Kulp, Assistant Surgeon, United States Army.

The medical and sanitary service of the German army is a separate staff division and has advisory superintendence of matters pertaining to the health of the troops, command of medical officers above the rank of major, and partial control of those in the junior grades. Its personnel is divided into (1) General-Stabsärzte der Armee, with relative rank of brigadier; (2) General-Ärzte, chief surgeons of corps, relatively colonels; (3) General-Oberärzte, chief surgeons of divisions, lieutenant colonels; (4) Oberstabsärzte, regimental surgeons, majors; (5) Stabsärzte, battalion surgeons, captains; (6) Oberärzte (first lieutenants), (7) Assistenzärzte (second lieutenants), assistant surgeons; (8) Sanitäts-Feldwebel, usually a graduate in medicine, sergeant-major; (9) Sanitäts-Sergeant, sergeant; (10) Sanitäts-Unteroffizier, corporal; (11) Sanitäts-Gefreiter, lance corporal or first-class private; (12) Sanitäts-Soldat, private.

The officers of the permanent service are thoroughly trained in the specialty of military medicine, the principal school being the Kaiser-Wilhelms-Akademie für das Militärärztliche Bildungswesen at Berlin. After the usual five years' course they are commissioned, with the understanding that they are then only ready to begin their service as medical officers, the continuation of which will require constant study and intelligent observation throughout their whole career. The perfect internal discipline of the corps is manifest at every turn, and the earnestness and enthu-

siasm of the personnel is worthy of mention. The possibility of having graduates in medicine as noncommissioned officers is explicable by the condition of universal military service, and from their experience it would seem that a similar requirement for our hospital stewards would be in the interest of increased efficiency.

There is no such organization as our hospital corps, but men (after one year's service in the line) are transferred to various schools, where they receive six months' instruction. This course is thorough and systematic, especially for the gefreiter, a grade which corresponds to our lance corporal or first-class private. Briefly, this instruction consists of lectures, demonstrations, and recitations on the duties of the hospital assistant within and without the hospital, including the care of the sick in quarters. Some of the other subjects of special instruction are the duty of the sanitary soldier when orderly, when detailed for the swimming or other exercises of the troops, and when chief of a hospital department. Accounting, clerical work, and the duties of a monitor receive detailed attention, and the course in elementary anatomy and physiology is simple, practical, and thorough.

After this preliminary instruction the student goes on to that on injuries, first aid, contagious and infectious diseases, disinfection, emergencies, dressings, and a study of the ailments peculiar to soldiers. The transportation of the sick is taught by practical work in hospital and field, and this is followed by an admirable course on the "care of the sick soldier in a military hospital." The systematic arrangement includes the sick man, the sick bed, the sick watch, the position and comfort of the patient, the observation of symptoms, the administration of nourishment and medicine, and the carrying out of orders. After this the men receive practical and theoretical instructions designed to qualify them as operating room assistants, dispensary assistants, and on the making of necropsies. A feature of all the teaching is that it not only states what is expected of the sanitary soldier, but also what he is not to attempt.

Ambulance companies are commanded by line officers, under the direction of chief surgeons, as the medical department does not possess a separate administrative service. The usual allowance of personnel and transportation are—

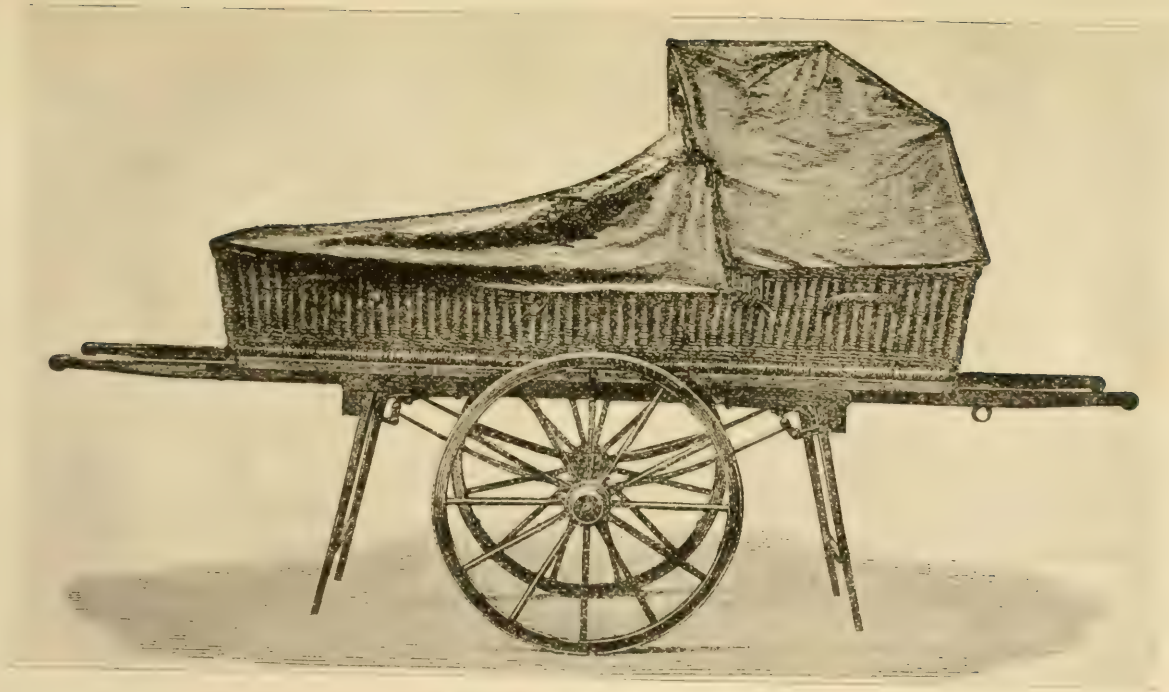
Medical officers	8
Line officers	3
Apothecary	1
Paymaster	1
Noncommissioned officers	14
Litter bearers (privates)	160
Other privates	67
Saddle horses	18
Draft horses	28
Wagon of "life-saving food"	1
Ambulance wagons	8
Wagons for dressings	2
Baggage wagons	2

To each army corps there are allowed 3 ambulance companies attached to divisions, and 2 held in reserve. The allowance of medical personnel to an infantry regiment of 3 battalions is usually 1 major, 2 captains, 3 lieutenants, 3 noncommissioned officers, and 12 privates in addition to the company bearers.

Medical department supplies.—In Germany, as in other countries which have learned the price of being unprepared for war, the medical department is in a position to take the field without delay. It is surprising to see in a country where comparative poverty among all classes is the rule rather than the exception, that the question of expense is hardly considered in the equipment of the army. The storehouses are of large size, well arranged, and clean. The officers in charge are alert and ambitious, and one of them was not only acquainted with the equipment of our own service, but had the proceedings of the Association of Military Surgeons, including the year 1899. The Train-Dépot des Garde-Corps, near Berlin, contains complete equipment for thousands of men in large brick storehouses with ample space. Painted chests are ready for packing, plainly marked on the outside with the names of the articles they are to contain, and on the inside so as to show the position of each piece. These chests are of suitable sizes to fit accurately into standard wagons and cars, and their contents are for the most part in small separate packages.

It is manifestly impossible to enumerate all the special features of interest, and indulgence is begged for the somewhat unsystematic method which is pursued in order to economize space.

The litters are of various patterns, but none seem so good as our own. The cover is laced on, and two heavy wheels with springs are provided so that one bearer can move it. All litters have large pockets and pillows, and one pattern of wheeled



A WHEELED LITTER, GERMAN ARMY.

litter with a wicker body (illustration) is not unnecessarily heavy. The sling is part of the litter, as it should be, and chain slings with spiral springs are provided for use on trains. There is an issue of bedsacks, designed for straw, which have loops along the sides through which poles can be slipped, thus making an extemporized litter.

There has been much care taken in the proper equipment of improvised hospital trains, knocked-down lockers being kept ready for use, and a single broad, flat spring, which reaches across a freight car and holds the ends of four litters, is simple and practical. The regular hospital car is of the small size usual in Germany, and has twelve beds with hair mattresses, bed-side tables, two reclining chairs, one wheeled chair, hammocks for clothing, such as are used on Pullman cars, similar lavatories to those in the cabins of steamers, and various lockers for supplies. The beds can be lifted off and used as litters, and are arranged on a simple system of springs allowing universal motion. The canvas bottom is laced to a light hollow frame (as in our Lein-Irvine standee), and can be used without the mattress if desired. One car in each train is fitted up as a kitchen, and carries two steam ranges (taking steam from the locomotive), one coal range, ice chests, cooking utensils, dishes, and cutlery sufficient for 300 sick. An ordinary freight car acts as its tender.

The wagon transportation of the medical department consists of ambulances of four patterns, pharmacy wagons, bake wagons, and baggage wagons of several kinds. None are so well made as our own. The best ambulance is a large double-decked one, weighing 1,470 pounds, and requiring two or four animals. It carries an ambulance guidon above the center of the top during the day and a red lantern at night in addition to its side lights. This elevated position of the lantern commends itself. There is a rack for arms behind the high driver's seat. A form of ambulance used only in cities has rubber tires, and litters resting on large inflated rubber balls.

The pharmacy wagon is four wheeled, with a projecting hood over the rear, and a wide tail-board, which when down forms a dispensing table. The wheels cut under, the contents are well arranged and easily accessible, while forage is carried in a separate compartment below the body of the wagon, the weight of which is 1,700 pounds. As in the French service, all brakes are operated by either a wheel or crank.

The bake wagons are in pairs, one vehicle containing the oven, and the other the kitchen. They are each drawn by two animals, and can supply an hundred loaves an hour while en route.

The baggage wagons are heavy and are not adapted to American roads.

The instrument cases are well made and well arranged. Manganium, an alloy of manganese and aluminum, on account of its freedom from corrosion by disinfectants, has largely taken the place of aluminum, in spite of its greater cost. In this connection it may be said that after ten years' trial aluminum has not proved as valuable as was expected, and although still used for instrument handles, mess utensils, and to some extent as a constructive material, an order was in preparation prohibiting its use where a break would render useless a vehicle or implement. Seven new patterns of instrument cases have been recently adopted, and they appear complete and of good quality. The largest of these cases is 51 by 29½ by 15 centimeters, and some of its features are the use of glove fasteners to hold racks in place, the racks themselves being removable from the trays in order to facilitate sterilization and allow for the latter being used for solutions, the numbering not only of instruments, but also the place in the case where they belong, the flat thin shape of the pocket case (15 by 25 by 1 centimeters), and many minor details, such as thumb places on the small saws, rubber tipped percussion hammers, and Bergman's latest chisels. Every large hospital contains instruments and dressings for two field hospitals of 200 beds each; and these are always kept in immediate readiness for transportation.

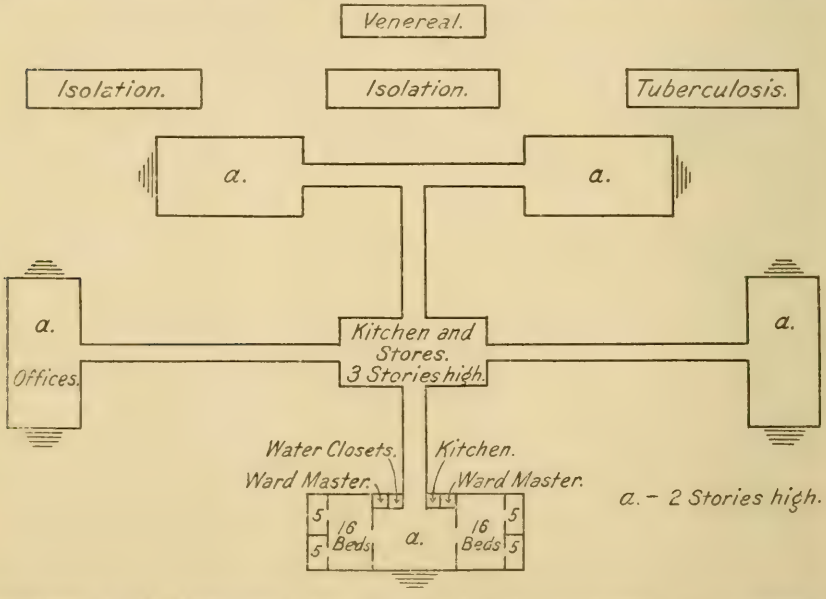
Hospital administration.—The largest hospital visited was the Garnisonslazareth in Tempelhof, which contains 750 beds. This is a permanent general hospital, built some twenty years ago, and is a separate military unit, commanded by a major of the medical department, who reports to the surgeon-general. On account of the age of the buildings it would be unfair to criticise their construction and arrangement from a modern standpoint, the general plan being as follows:

The entire grounds are inclosed by a high brick wall and are beautifully laid out, a feature of all German hospitals being the lustplätze for the recreation of convalescents. In regard to the institution as a whole, the police was very good, the clothing and appearance of the personnel fair, and the discipline perfect. The personnel seemed to me to be overworked and the institution correspondingly undermanned. For instance, in this hospital of 750 beds, 359 were occupied on the day of my visit, and the working force consisted of but 72 persons. These received aid from several gardeners and the convalescents were used rather unsparingly, I thought. Structural defects in the heating and cooking arrangements added much labor, and there

was an apparent lack of labor-saving appliances. The office work is not conducted on modern lines, the card system being unknown, and even typewriters but seldom used. A clean-cut system of recording and indexing appears much needed by European services.

Among the special features of this hospital are a well-equipped gymnasium containing machines for almost every form of passive motion, and an unusually complete X-ray department adjoining the operating rooms, which had the only females I saw in the institution—several wrinkled old hags, with kind faces. Almost every ward has its own kitchen, in addition to that for the general mess. This latter was clean and well managed, and had as its personnel a commissioned inspector, 1 noncommissioned officer, 2 cooks, 2 help , 2 dishwashers, and a butcher; 1.07 marks (about 26 cents) is allowed per ration and the diet is very liberal, the dinner for the day being clear soup, roast pork, noodles, green beans, roast potatoes, bread, and butter. It was well cooked and well served. Wine is furnished on most of the regular diet forms.

Field service.—The medical department of the German army exists for war and is ready for war. The field methods are, however, so radically different from our own that it is difficult to make just comparison. Canvas is little used, and when tentage is provided the troops sleep on it as often as under it. At the time of my visit there was a movement toward having all medical-department tentage of a special color, a



grass green, and this appears an excellent idea for various reasons. Tent pegs are metal bound and tipped.

Field hospitals have already been mentioned, valuable features of which are mobility and divisibility. The usual size contains 200 beds, and this is separable into two of 100 beds each, and they can pack up and move as quickly as a regiment. Portable huts are much used for semi-permanent hospitals, and sufficient of these for two hundred beds can be erected or torn down in between four and five hours. A feature of the field work is the arrangement for carrying it on at night, signal rockets, torches, and lanterns being provided in large numbers. The amount of transportation furnished the medical department seems sufficient, and the draft animals are superior to our own. In time of war all private horses are seizable by the Government.

The annual maneuvers give medical officers valuable lessons in field administration, and the necessity of a knowledge of terrain by chief surgeons seems to be well understood. Map making and especially map reading are of as great service to our own as to other staff departments.

Conclusion.—Germany is not so much a country with a large army as a nation in arms. Where every man is a trained soldier the medical officer enters the army with a technical knowledge secondary in value only to his professional education. It is

PORTABLE HUTS USED IN THE GERMAN SERVICE — CAPACITY 18 BEDS

INTERIOR OF A HUT USED AS A READING ROOM.

only by a union of the highest professional fitness with the ability to administer and command that a competent medical service is possible. In his earnest endeavor for improvement the German officer is second to none, the material equipment of his army is excellent, but in administrative methods we have little to learn from "The country in which all knowledge begins and ends."

In closing this report I desire to acknowledge my indebtedness to Lieut. Col. John B. Kerr, United States military attaché at Berlin, without whose intimate acquaintance with official methods and courteous assistance it would have been impossible to have gained the above information in the brief time at my disposal.

REPORT OF OBSERVATIONS ON THE ORGANIZATION AND SERVICE OF THE MEDICAL DEPARTMENT OF THE FRENCH ARMY, MADE DURING THE MONTH OF JUNE, 1901, BY CAPT. JOHN S. KULP, ASSISTANT SURGEON, UNITED STATES ARMY.

Organization.—The medical department (service de santé) is one of the five administrative departments of the French army, and is under the direction of its own officers, who are charged with carrying out of medical and hygienic measures, the command of the civil and military personnel permanently or temporarily attached to their service, and the administration and interior discipline of their corps. Unlike most foreign services, they are also charged with securing the material necessary to maintain and equip hospitals and sanitary organizations.

Personnel—Officers.—The officers of the corps are military surgeons, military pharmacists, and administrative officers.

Of the first class, there are:

Medical inspector-general, rank of major-general	1
Medical inspectors, rank of brigadier-general	11
Senior chief surgeons, rank of colonel	45
Junior chief surgeons, rank of lieutenant-colonel	60
Senior surgeons, rank of major	340
Junior surgeons, rank of captain	510
Senior assistant surgeons, rank of first lieutenant	406
Junior assistant surgeons, rank of second lieutenant	100
Total	1,473

Added to these there are:

Pharmaceutical inspector, rank of brigadier-general	1
Senior chief pharmacists, rank of colonel	4
Junior chief pharmacists, rank of lieutenant-colonel	5
Senior pharmacists, rank of major	30
Junior pharmacists, rank of captain	45
Senior assistant pharmacists, rank of first lieutenant	20
Junior assistant pharmacists, rank of second lieutenant	10
Total	115

The administrative service consists of:

Principal administrative officers, rank of major	18
Administrative officers of the first class, rank of captain	140
Administrative officers of the second class, rank of first lieutenant Administrative officers of the third class, rank of second lieutenant	192
Total	350

Variations from the rule of promotion according to seniority may be made because of acts of special devotion or courage, or when it is imperative that vacancies be filled, and in all cases the time served in war or in the colonies is doubled in computing the length of service. The retiring age varies according to the grade, thus, colonels retire at 60, lieutenant-colonels at 58, majors at 56, captains at 53, and lieutenants at 52.

The pay proper of officers is as follows:

Major-generals	$3,780	Majors	$1,101
Brigadier-generals	2,520	Captains	612–830
Colonels	1,627	First lieutenants	504–540
Lieutenant-colonels	1,317	Second lieutenants	468

Soldiers.—The enlisted men under the command of the medical department are divided into nurses, clerks, and workmen, and company litter bearers. Of these

only the first class are directly under the personal command of medical officers, the second class is controlled by administrative officers (themselves under the command of medical officers), while the third, as a rule, are commanded by their own regimental superiors.

To each of the 25 army corps there is a section of military nurses, but the strength of this section depends upon the fiat of the minister for war, and varies greatly according to the time and the station. The composition of each section is as follows: Sergeant-major, sergeant-farrier, sergeant-clerk, sergeant instructor (in charge of property), corporal-farrier, corporal-clerk, and corporal instructor. The proportion of these noncommissioned officers is 1 sergeant and 2 corporals to each 13 privates. In addition there are 42 warrant officers, called adjutants, all of which are really under instruction. The privates are graded as clerks, workmen, tailors, shoemakers, buglers, and canteen stewards.

Company bearers are detailed in much the same way as was formerly done in our own service, but are divided into two classes, and their strength varies according to the peace or war footing of the army. On a war footing they constitute about 3 per cent of the force. The term of regular enlistment is five years, and the compulsory military service three.

Instructions.—The army medical school (Paris) is conducted on military principles, although for the purpose of giving assistant surgeons and pharmacists instruction in the theory and practice of the specialty of military medicine. For this purpose the Val-de-Grâce hospital is attached to it and placed under charge of the brigadier commanding the school (un medicin inspecteur), who reports directly to the minister for war. The school is governed by three boards of officers—of improvement, of administration, and of discipline. The course begins on the 1st of February of each year and continues for nine months, after which those student officers who have successfully passed the examination are commissioned junior assistant surgeons with rank of second lieutenants.

The school at Lyons is under the control of its own faculty, and has for its object (*a*) to make provision for obtaining sufficiency of army surgeons, (*b*) to supplement the studies of the candidates for the medical department of the army, (*c*) to give to these latter a certain amount of military training preparatory to their admission to the school of Paris. To meet the requirements of admission the candidate must be a French citizen between 17 and 23 years of age, must pay a yearly fee of a thousand francs, and must provide himself with his own outfit. In case of students "who prove a deficiency in the wealth of their family" half or whole scholarship may be granted by the minister for war. Especial emphasis is placed on the military character of the instruction, and students have their quarters and mess at the school.

There are schools for the study of military pharmacy at Bordeaux, Lille, Lyons, Montpellier, Nancy, Paris, and Toulouse, and pupils are allowed a choice among them. While under instruction they are attached to military hospitals, and placed under the command of medical officers.

The instruction of the enlisted personnel is military, technical, and professional in its nature, there being also special training for artificers. Men who are proficient in the care and management of steam apparatus, such as sterilizers, automobiles, laundry machines, and the like, receive the grade of corporal.

The military instruction extends over a period of six weeks under the personal command of an officer of the administrative service, who carries out the course prescribed by the medical officer. By an especial regulation the chief surgeon is directed to allow nothing to interfere with the course, and ordered to insure its continuance during succeeding hospital service (without regard to other duties) for at least two hours per week.

Following the period of military instruction, desirable men are selected for a "platoon for special instruction," which is designed to produce men who are trained nurses, clerks, officers' secretaries, and generally useful. Those possessing sufficient aptitude are made corporals, although in order to obtain promotion it is almost necessary that the men have had instruction at the school for mechanicians as well.

The "technical" instruction which follows is given only to graduates of the platoon of special instruction, and consists in a course of clerical work, hygiene minor surgery, sterilization, baths, and bandaging. The training is both theoretical and practical and continues three months.

"Professional training" is given throughout the year to all the enlisted personnel on the general organization and the duties of the medical department with especial reference to field service, the care and transportation of sick and wounded, and the various duties required in hospital work. From this training there must be no absentees, and the orders on the subject enjoin that it be carried on "with great personal care and constant solicitude, not only with reference to immediate satisfactory

results, but always with especial thought and preparation for service in war." As a further course in professional training, certain men receive more advanced teaching in massage, medical bathing, and the care of steam apparatus.

Considering the care and attention to detail with which every part of the training of the recruit is guarded, the men of the hospital service with whom I conversed did not seem to have reached a high standard of fitness.

Field service.—As laid down by the regulations, the duties of the medical department in the field are (*a*) the provision, preparation, and execution of hygienic measures intended to preserve the good condition and health of the troops. It is expected to (*b*) attend the sick and wounded on the march and upon the field of battle; (*c*) to see that the sick and wounded are methodically selected out, both for the purpose of preserving the effective strength as well as to prevent crowding of the field operations; (*d*) to be responsible for the treatment of the slightly disabled on the spot, and those who from the gravity of their cases can not be moved; (*e*) to secure the rapid evacuation toward the rear of all other sick and wounded; (*f*) to take measures to combat epidemics and to protect the country against their importation; (*g*) to initiate measures for extending hospital establishments at the base, and to create new institutions in order to meet with satisfaction all the necessities arising from a state of war; (*h*) to assume charge of sanitary affairs during sieges, and to provide troops with medicines, dressings, and surgical supplies.

Field service is divided into the service of the front and that of the rear. The service of the front comprises whatever affects the marching personnel, while that of the rear includes all sanitary formations, "which although a part of the army do not march with the troops." These sanitary formations of the rear are exempt from control of the general commanding at the front.

Service of the front.—The service of the front includes the regimental detachment which gives aid in station, on the march, and during battle, the ambulance or dressing station, and the field hospitals. These latter are designed to relieve the dressing stations of their wounded during the evening of the fight, or at latest the next morning. They treat on the battlefield if necessary and practicable such wounded as can not be removed, thus often reenforcing the dressing stations; the whole idea being a motile organization controlled by the medical department, which is held responsible for its efficiency. In carrying out this idea each field hospital is regarded as a part of a general whole, and can either coalesce with others to form one of larger proportions, or, on the other hand, can divide into separate halves, each capable of remaining independent for an indefinite period. In the normal order of march the field hospitals form a special train of their own, immediately behind that of the subsistence department. When, however, the field hospitals are distributed throughout the divisions, they march ahead of the regimental trains and behind their guard.

Service of the rear.—The service of the rear is carried out along two distinct lines, first, the care of the disabled along the line of communication, thus including such field hospitals as are mobilized within the rear zone and contain wounded who can not be further removed. This use of field hospitals is, however, strongly condemned, and is resorted to only in exceptional cases, such as sudden epidemics, or on the breaking down of auxiliary or permanent institutions.

Charitable organizations are a recognized branch of relief, but they are governed by regular laws promulgated by the General Government, are under the direct command of the Medical Department of the Army, and from current report are business-like organizations devoid of hysterical manifestations. Their sphere of influence includes the whole service of the rear, but applies especially to the permanent institutions converted to military use.

All along the lines of communication are well-named "evacuation hospitals" made from railway stations, hotels, churches, or other buildings, and these are kept supplied from the base with material in excess of their needs, so that they may act as reserve depots. Whenever these hospitals are of a military character it is stipulated that they be made divisible, both as regards material and personnel. This personnel consists of regular, reserve, and volunteer medical officers, administrative officers, nurses, litter bearers, clergymen, teamsters, and various civilians. The evacuation hospital is understood to be a place for temporary treatment, and every effort is directed to keeping its beds ready to receive those from the front.

The second division of the service of the rear contains the hospitals and other institutions of the base, which in time of war are all under military control.

Transportation.—The following varieties of wheeled transportation are in use by the medical department:

Each regiment of infantry or of field artillery is provided with a 2-wheeled cart, which has a wheel brake, a lantern, and weighs about 300 pounds. This cart contains materials for 300 dressings, including half a dozen regimental panniers, a

10-liter canister, a 30-liter cask, a set of blanks, red and white lanterns, Red Cross and national flags, and certain other articles on racks depending on the arm of the service. These carts, although designed for a single animal, can be readily drawn by men and are designed for service at the real front. Two recumbent patients can be crowded into one of them.

The 4-wheeled regimental wagon (not ambulance) is a strong, heavy vehicle, the front wheels of which are cut under, and which has a lamp and wheel brake on the right side, a canvas cover, and sufficient length of bed to carry 2 reclining patients in an emergency. It carries much the same supply as the cart, but in larger quantity.

The wagon for non-mounted personnel is a large covered 4-wheeled omnibus, having 4 windows in the sides, a high driver's seat in front, and padded seats within for 8 officers. This wagon, by means of which 2 horses transport 8 persons and their baggage, is distinctly of value.

The surgical wagon is intended to be drawn by 4 horses, has wooden sides and top, and weighs loaded 1,850 kilograms, of which 810 constitute the load. It has doors at the sides and rear, and carries an admirably arranged assortment of dressings, surgical instruments, medicines, and supplies. Every part of this material is readily accessible.

The administration wagon is also a 4-horse vehicle, with wooden sides and top, weighing 1,100 kilograms. As in all the wagons of this class, it is divided in two parts, and carries a complete office equipment, including records, blanks, and stationery. In the rear, but completely separated by a partition, are the mess supplies, kitchen furniture, water and wine tanks for a variable number of men.

The reserve baggage wagon of the medical department (fourgon de service de santé) is a well-made, strong, 4-wheeled vehicle, with wheel brake and lanterns, canvas covered on a wooden frame, high wooden sides, 3 steps at the rear, and platform springs. It can be used to carry sick in an emergency. Six of these wagons constitute a set, and are lettered, according to their contents, from A to F. Briefly, wagon A contains dressings, splints, 15 blankets, and a 50-liter cask. This carrying of receptacles for sterilized water or wine is considered of prime importance. Wagon B contains fracture pads, shirts, prepared lint, medicine in cases, ax, pick, spade, and crow. Practically everything is packed in panniers in all the wagons. Wagons C and D are attached to the headquarters of each corps, while each division has wagons A and B. C and D have identical contents, the idea being that either can be sent without delay to that part of the corps needing them most, and they contain complete operation, medical, and surgical supplies for 2 field hospitals, lanterns, flags, nose bags, casks, buckets, and material for the repair of harness. Wagon E carries the same supplies as F, namely, a hospital tent (20–13–8), 25 litters, buckets, 30 liters of brandy, and 50 liters of wine. In addition it carries officers' mess chests and a limited amount of their baggage.

Besides the above there are army wagons (fourgons ordinaires) used for carrying rations and other regular impedimenta. They do not seem as well made as our own escort wagon and are of about the same capacity. The steam sterilizer (system of Geneste and Herscher) is too heavy for transportation on American roads by less than 6 animals.

Of ambulances proper there are two principal models, the 2-wheeled carrying 2 recumbent patients and the 4-wheeled carrying 4. The former is light enough to be easily drawn by a single animal, and can go almost anywhere. The latter is not so good an ambulance as is our own as modified by Munson. I am informed that wounded are often preferably transported in the high French hay-wagon, which will take as many as 10 litters.

The wagon train when practicable is drawn by an automobile at a rate of between 3 and 4 miles an hour. This they find cheaper and more convenient than horses, and it is believed to be practicable for our own roads as well. The train of the medical department is a separate command—a divisible unit—under medical and administrative officers who have been trained for this line of work. The transportation for an army corps consists of the following, so far as the medical department is concerned:

Allowance of transportation for medical department of a corps.—With the headquarters of the corps: One wagon for personnel, 2 surgical wagons, 2 administrative wagons, 2 set reserve baggage wagons (A to F), 2 food wagons, 8 two-wheeled ambulances, and 6 four-wheeled ambulances.

To each of the divisions of infantry there are allowed the same, except that there are but 4 each of both two and four wheeled ambulances.

For the cavalry regiment of four squadrons: Two reserve baggage wagons, A and B, 3 two-wheeled ambulances, and 3 four-wheeled ambulances.

For each of the 8 field hospitals: Four reserve baggage wagons, A, B, C, and D.

For the hospital evacuation: Two complete field hospitals, 4 wagons containing 6,400 dressings, 3 improved sanitary trains, and 1 wagon for medical necessities.

Relative position of medical department in line of march.—The order of march of an army corps, if in a single column, is as follows:

Head of advance guard:
Cavalry.
Battalion of infantry.
Detachment of pioneers.
Body of advance guard (3½ miles long):
Headquarters first division.
Headquarters first brigade.
Two battalions of infantry.
Two batteries artillery.
Two regiments of infantry.
Medical service of the first brigade.
Camp equipment.
(One and one-half miles interval.)
Body of the column:
Corps headquarters.
Headquarters second brigade.
Battalion infantry.
Three batteries artillery.
Third and fourth regiments.
} Covering a space of about 7¾ miles.
Medical service of the second brigade.
Engineer detachment.
Batteries of artillery in three groups (9⅜ miles).
Headquarters second division.
Engineers.
Headquarters third brigade.
Fifth and sixth regiments.
Six batteries.
Headquarters fourth brigade.
Seventh regiment.
One battalion of infantry.
} Occupying a space of about 14½ miles.
Medical service of the second division.
Ammunition train in 9 sections.
Rear guard:
Four companies of infantry.
Cavalry.
Wagon trains and their guards:
Medical service of the corps.
Three field hospitals.
Regimental wagon trains.
Two companies of infantry.
Administrative convoy.
Five field hospitals.
Extra wagons and horses.

The above distances as given in Service de Santé de l'Armée en Campagne, page 143, are believed to be largely theoretical, and the time allowance of 3¼ miles an hour is assuredly so. The order of march of the medical department of a corps is as follows, and this column is said to be 600 yards in length:

Chief medical officer.
Chief of the first section.
Administrative officer in command of hospital corps.
Religious ministers.
Hospital corps (nurses), in two detachments.
Hospital corps (litter bearers) in two platoons.
Officers commanding train.
Veterinary surgeon.
Bugler and noncommissioned officers.
Wagon for unmounted officers.
Mules for litters and cacolets.
Four two-wheeled ambulances.
Three four-wheeled ambulances.
Surgical wagon.
Administrative wagon.
Three medical department wagons.

Commissary wagon.
Workmen on foot.
Thirty-five feet interval.
Medical officer.
Administrative officer.
Third and fourth detachments of hospital corps (nurses).
Third and fourth platoons of litter bearers.
Officer commanding train.
Bugler and noncommissioned officers.
Mules for cacolets and litters.
Four two-wheeled ambulances.
Three four-wheeled ambulances.
Surgical wagon.
Administrative wagon.
Three medical department baggage wagons.
Commissary wagon.
Unmounted personnel of the train.

In the French service everything pertaining to the subject of transportation is laid down in such an exact manner that in time of war it would seem that there would be little else to do than to carry out orders. For instance, on the subject of dressings and litters, the allowance transported by each military unit is definite, the total for a mobilized army corps being 18,870 dressings and 272 litters. The care and thoroughness of their regulations is admirable in its attention to details. Thus the maxima and minima loads are always noted, the speed of the wagon train is calculated, and each part of a load is either numbered or else there is notation on the floor or side of the vehicle to show its place. In the case of long trains each wagon bears its individual number, so that it has a definite place, and the change from animals to automobiles is made by simply slinging the pole of the wagon beneath them, and coupling them together. The driver retains his place in order to apply the brake and guide the vehicle.

Hospitals.—Hospitals vary in size from Val-de-Grâce, with its 1,137 beds, to that of Mont Louis, with but 27. The colonial hospitals, judging from their printed reports, are not only very large (those of 500 beds being rather numerous), but are very economically administered. The general classification is the same throughout the Republic, the classes being: Hors classe, as Val-de-Grâce and a few others mainly devoted to special work or to special classes of patients, and first, second, third, fourth, fifth, and sixth classes, according to their importance and financial allowances. The number of beds now varies widely in hospitals of the same class, but is approximately 80 beds for the sixth class and an increase of about 80 for each class above it. The allowance of personnel is also interesting; the various divisions of the men being medical officers, administrative officers, pharmacists, clerks, janitors, cooks, dispensers, property men, bath men, clergy, surgical orderlies, sergeant supervisor, canteen sergeant, outside orderlies, administrative officers' orderlies, gardeners, barbers, painters and whitewashers, clothing men, soldiers in charge of fuel and of lights, mattress makers, carpenters, locksmiths, plumbers, shoemakers, tailors, firemen, printers, waiters, and ward men. The noncommissioned officers are sergeant-major, sergeant, and corporal. With the exception of the noncommissioned officers, the above constitutes the permanent personnel of the hospital, the allowance of which (independently of the number of patients) is as follows: Val-de-Grâce, 77; first class, 53; second class, 45; third class, 35; fourth class, 29; fifth class, 22, and sixth class, 20.

Added to this is the variable personnel, which depends on the number of patients in the wards, and is:

For each ward	privates	3
For each 3 officers treated	private	1
For each 5 noncommissioned officers	do	1
For each 8 soldiers	do	1
For each medical or administrative officer on duty	do	1
For each ward	noncommissioned officer	1

To this number is then added 10 per cent to allow for men of the hospital corps who are on leave or sick and for the special care of the field outfit attached to every hospital.

The allowance of medical and administrative officers varies greatly, and there is a tendency to have a permanent and variable one here also. It is said that there is less rotation in station in our own service.

In regard to the actual work of the hospitals, the time at my disposal was too limited to give sufficient data on which to generalize. It chanced that the Val-de-

Grâce was visited on the day of their annual inspection, but the police of the building was not all that one would expect. The hospital corps seemed to me undersized and not well set up, but the commissioned officers presented a clean-cut, soldierly appearance decidedly above the average. Here, as elsewhere in Europe, mounted officers wear their spurs whenever on duty.

Conclusion.—Modern methods of warfare affect the medical department no less than the line and in various directions. The placing of a weapon in the hands of an infantryman which is effective to the limit of his vision has deepened the service of the front to such an extent that problems of first aid and transportation are more difficult than ever. The modern long thin line, without support, and with reserves only at great distance must necessarily expose the one staff department always under fire and demands extra personnel to provide for losses and to cover the increased space. The white brassard under certain conditions becomes a death warrant, for the soldier of to-day is not only the hunter but is also the game, and the uniform of the sanitary soldier must not differ conspicuously from that of those around him. The French medical department seems thoroughly alive to these changed conditions and is devoting thought and labor to the most important but almost undeveloped subject of the sanitary service of the zone of fire. With this end in view they lay particular stress on (*a*) military discipline, (*b*) a medical department trained in administrative work, (*c*) a soldierly personnel which can be relied on under fire, and (*d*) carefully thought-out provision for the transportation of men and supplies, designed to meet the exigencies of actual war.

CONCLUSION.

In concluding this, my last report as Surgeon-General of the Army, I desire to call attention briefly to some of the more important facts relating to the history of the Medical Department during the period of my service in this capacity. It has been my constant aim to maintain a high standard of professional attainment among the medical officers of the Army. With this end in view they have been liberally supplied with professional books and periodicals, and, so far as practicable, the younger members of the corps have been given stations where they would have opportunities for improving themselves professionally, and at the same time have been made to understand that the examinations required by law to be made in advance of their promotion to the grade of captain and major would be so rigid as to require their best efforts to keep *au courant* with the advancement of medical knowledge and its practical application. In order that medical officers who were approaching the time when they would be required to pass an examination for promotion to a majority might have an opportunity to prepare themselves for this examination, upon my recommendation the following regulation, which now constitutes paragraph 12 of the Manual for the Medical Department, edition of 1900, was approved by the honorable the Secretary of War in 1893:

The Surgeon-General will recommend the assignment as attending surgeons in the principal medical centers of the United States of medical officers who have not yet passed their examinations for promotion to a majority and, so far as may be practicable, in the order of their seniority. These details will be made for one year only, in order that as many medical officers as possible may be enabled to avail themselves of the opportunities thus offered for making themselves familiar with the practice of the leading physicians and surgeons in this country and of attending medical lectures, meetings of medical societies, etc. At the end of this tour of duty medical officers are required to make a detailed report to the Surgeon-General, showing how much of their time has been occupied by their official duties and to what extent they have availed themselves of the advantages offered for professional advancement.

For the instruction of medical officers recently appointed, the Army Medical School was established in this city June 24, 1893.

The course of instruction covers a period of five months, and is given annually at the Army Medical Museum in Washington, D. C., commencing on the first Monday

of November. It includes lectures on and practical instruction in (*a*) the duties of medical officers in war and peace. (*b*) Military surgery, the care of the wounded in time of war, and hospital administration. (*c*) Military hygiene. (*d*) Military medicine. (*e*) Microscopy, sanitary and clinical; pathological histology, bacteriology, and urinology. (*f*) Hospital Corps drill, and first aid to wounded.

Realizing that the best surgical work could not be expected from our medical officers unless they were supplied with the most modern and approved instruments and appliances, I have endeavored to make our equipment for surgical work, in hospitals or in the field, as complete as could be desired. I have insisted upon every hospital of any size being provided with a suitable operating room, furnished with all the appliances required for aseptic surgical work, and with a laboratory fitted up for such bacteriological, pathological, and chemical investigations as might be required in connection with clinical work, and also for carrying on original investigations for the advancement of medical science. As a result of this policy we have a considerable number of medical officers in the corps who are well fitted for undertaking original research work, and during the past two years results of the highest value have been attained by the boards, appointed upon my recommendation, for the study of tropical diseases in Cuba and in the Philippines. (See p. 176 and p. 202.) All of the members of these boards have given evidence of zeal and ability in the prosecution of the work assigned to them. The board in Cuba, of which Major Reed, surgeon, United States Army, is president, has attained results of the greatest value, and Major Reed is worthy of special commendation for the scientific acumen he has displayed in planning and carrying out the experiments which have led to the demonstration that yellow fever is transmitted from man to man by mosquitoes.

Dr. James Carroll, contract surgeon, United States Army, a member of this board, has also distinguished himself by his intelligent and self-sacrificing devotion to the investigation with which the board was charged. He first submitted himself to mosquito inoculation, and as a result suffered a severe attack of yellow fever. The credit due him is no less than that which has been universally awarded to his less fortunate colleague, Dr. Jesse W. Lazear, who died as a result of a similar inoculation.

First Lieut. Richard P. Strong, assistant surgeon, United States Army, and First Lieut. William J. Calvert, assistant surgeon, United States Army, members of the board for the study of tropical diseases in the Philippines, have made valuable contributions to our knowledge of these diseases, and especially of tropical dysentery and bubonic plague.

The selection resulting from a rigid entrance examination, together with the facilities afforded medical officers for maintaining a high standard of professional attainments, has given to the Army a medical corps of which it may well be proud, and, as a matter of fact, I believe that with few exceptions our medical officers enjoy the respect and esteem of their fellow-officers of the line, with whom they are most intimately associated and whose hardships and dangers they are called upon to share. In this, my final report, I desire to express my high appreciation of the services which have been rendered by the medical officers of the Army, of all grades, during and since the Spanish-American war, under conditions which have taxed to the utmost their physical and mental powers of endurance. The value of previous training and experience in the military service has been amply demonstrated, and it must be apparent to all who are familiar with facts that

trained medical officers are as essential to the well-being of an Army as trained soldiers, and that a practitioner of medicine or surgery, however well informed, has much to learn before he is fitted to assume the duties of a medical officer, especially in time of war.

Since my appointment new and modern hospitals have been built at the following-named posts: Washington Barracks, D. C., Fort McHenry, Md., Fort Myer, Va., Fort Wadsworth, N. Y., Fort Monroe, Va., Fort Hamilton, N. Y., Fort Hancock, N. J., Fort Snelling, Minn., Fort Slocum, N. Y., Fort Adams, R. I., Madison Barracks, N. Y., Fort Terry, N. Y., Fort Preble, Me., Fort Leavenworth, Kans., Fort Williams, Me., Fort Ontario, N. Y., Fort Washington, Md., Fort Keogh, Mont., Fort Robinson, Nebr., Fort Ethan Allen, Vt., Fort Crook, Nebr., Fort Meade, S. Dak., Plattsburg Barracks, N. Y., Fort Wright, Wash., Fort Baker, Cal., Fort H. G. Wright, N. Y., Fort Strong, Mass., and Great Diamond Island, Maine. These are brick buildings of an approved plan, and for the most part are heated by hot water. All are provided with operating rooms and laboratories.

The Army and Navy Hospital at Hot Springs has been greatly enlarged and improved, and upon my recommendation, approved by the President, discharged volunteer soldiers are now admitted for treatment. The commanding officer, Maj. George H. Torney, surgeon United States Army, deserves great credit for the energy and ability he has displayed in the management of this hospital.

The post hospital at Washington Barracks was made a general hospital, at my request, in September, 1898. It has recently been enlarged and now has a capacity of 50 beds. Many serious surgical cases have been successfully treated in this hospital, and it has proved most useful not only for the care of the sick and wounded, but also for the instruction of young medical officers attending the Army Medical School. Major W. C. Borden, the commanding officer, deserves great credit for his able administration of the affairs of the hospital and for the successful results attained in the treatment of a large number of serious surgical cases. Maj. H. O. Perley, surgeon, United States Army, has rendered most efficient services as commanding officer of the Army hospital ship *Relief*, which, under his able management, has proved to be of the greatest utility and has justly been considered a model hospital ship.

During the Spanish-American war, general hospitals were established at Fort Myer, Va., Fort Thomas, Ky., Fort McPherson, Ga., Key West, Fla., Fort Monroe, Va., Savannah, Ga., Chickamauga Park, Tenn., and at the Presidio, San Francisco, Cal. After the muster out of our Volunteer Army we were able to dispense with all of these general hospitals with the exception of that at the Presidio. This hospital, under the able management of Lieutenant-Colonel A. C. Girard, deputy surgeon-general, has served a most useful purpose in caring for our sick and wounded soldiers returning from the Philippines. I consider the Presidio General Hospital a model military hospital, and invite special attention to the interesting reports of Lieutenant-Colonel Girard, published in this volume (pp. 78 to 125 and 288 to 297), which give a full account of the medical and surgical work accomplished during the fiscal year ending June 30, 1901.

An account of our hospital for the treatment of cases of tuberculosis will be found on page 13. This hospital was established in 1899, and has proved to be of inestimable value for the treatment of the victims

of pulmonary tuberculosis, and also enables us to remove these cases promptly from the wards of general and post hospitals, thus greatly reducing the chances of the propagation of the disease among our soldiers. Maj. Daniel M. Appel, surgeon, United States Army, has been indefatigable in his efforts to make this a model sanitarium and in his attention to the interests of the sick under his care.

I also invite attention to that portion of this report which relates to the operation for the radical cure of hernia (pp. 244 to 250). The policy of operating upon soldiers for the radical cure of hernia, and thus retaining their services in the ranks instead of discharging them, to become pensioners, has been attended with most favorable results. It has also given army surgeons an opportunity to demonstrate their skill in the performance of a difficult operation and to show that the results of their surgical work compare favorably with the best results obtained by the leading surgeons in civil life. The same is true as regards operations for appendicitis and emergency surgery generally.

The appropriation for the Medical Department prior to the Spanish-American war varied from $170,000 in 1893 to $140,000 in 1897. With these small appropriations it was impracticable to accumulate a reserve supply for any sudden emergency which might arise, and after the declaration of war in 1898, so soon as funds were available, it became necessary to purchase the field equipment required by our Volunteer Army of 250,000 men. The manufacture of medical chests and of the various articles pertaining to the field equipment of a regiment required time, and in spite of every effort to expedite the manufacture and delivery of these necessary articles many regiments were obliged to wait for some weeks before they received their full field equipment. This was the cause of much dissatisfaction and unfavorable criticism of the Department, but under the circumstances was entirely unavoidable. Constant efforts have been made to perfect our field equipment, and I am informed by medical officers attached to our forces in China during the recent military operations in that country that it was generally recognized as being superior to that of any other nation. At present our enlarged supply depots are filled with medical supplies of all kinds, and it is the policy of the Department to keep on hand at all times a field outfit sufficient for the immediate supply of at least 100,000 men in addition to those now in service. Before the Spanish-American war my most reasonable estimates for the Medical Department were frequently reduced by Congress, and barely enough money was appropriated to meet current expenses. But since that time appropriations have been liberal, as will be seen by the following figures: 1897, $140,500; 1898, $135,200; 1899, $2,765,000; 1900, $1,500,000; 1901, $2,000,000.

While the officers of the Medical Department, the volunteer medical officers, and contract surgeons in the service have as a rule rendered faithful and satisfactory services, I consider it my duty to call special attention to the services of a few of those who have occupied positions of the greatest responsibility.

Col. Chas. R. Greenleaf, assistant surgeon-general, chief surgeon Division of the Philippines, has administered the affairs pertaining to the medical department in that division with conspicuous ability. Col. Wm. H. Forwood, assistant surgeon-general, chief surgeon Department of California, has occupied a position only second in importance to that of the chief surgeon in the Philippine Islands, as all troops

going to or returning from these islands are detained for a greater or less length of time in San Francisco, and a large number of sick soldiers are brought to that city by returning transports. He has been most faithful and zealous in the performance of his responsible duties, and has given evidence of excellent executive ability, not only as chief surgeon of an important department, but as acting Surgeon-General of the Army during my absence on an inspecting trip in the Philippines.

Col. Justus M. Brown, assistant surgeon-general, has performed the duties of medical supply officer in New York City, during and since the Spanish-American war, in a most creditable and satisfactory manner. Col. Charles Smart, assistant surgeon-general, in charge of the sanitary division of my office, has, as usual, performed the important duties devolving upon him with untiring zeal and distinguished ability. Col. Calvin De Witt, assistant surgeon-general, in charge of the museum and library division of my office and president of the army medical examining board in this city, has performed all of the duties pertaining to these responsible positions in a most satisfactory manner. Maj. Valery Havard, chief surgeon, Department of Cuba, has administered the affairs of the Medical Department in that island in a most intelligent and creditable manner. Maj. John Van R. Hoff, surgeon, United States Army, having made an excellent record as chief surgeon in Porto Rico, was selected by me as chief surgeon of the China relief expedition, but upon his arrival in China hostilities were over, and at my request he was ordered to this city for duty in my office. He was placed in charge of the Hospital Corps division and of the supply depot at the Army Medical Museum and has performed all of the duties devolving upon him with zeal and ability. Maj. William B. Banister, surgeon, United States Army, accompanied the troops from Manila to China and acted as chief surgeon of the expedition until the arrival of Maj. Francis J. Ives, surgeon, United States Army, on September 25, 1900, who continued to act as chief surgeon until the withdrawal of all of our troops with the exception of a legation guard. These medical officers distinguished themselves by their efficient management of the affairs of the Medical Department during the expedition to China and the occupation of Pekin.

Mrs. Dita H. Kinney was appointed superintendent of the female nurse corps in March, 1901. She has given evidence of an intelligent appreciation of the interests of the female nurse corps and of the service, of excellent judgment and of administrative ability.

I desire also to testify to the excellent services rendered, not only during the past year, but for many years, by some of the senior clerks in my office. The following named are worthy of special commendation on account of their zealous and efficient performance of the duties assigned them: Mr. George A. Jones, chief clerk; Mr. Joseph R. Rose, assistant to chief clerk; Mr. T. A. Haviland, in charge of records; Mr. B. F. Williams, in charge of correspondence; Mr. B. B. Thompson, in charge of accounts; Mr. D. G. Dixon, chief clerk supply division; Mr. A. M. Buck, chief clerk sanitary and disbursing division; Mr. W. H. Degges, in charge of statistical section; Mr. R. Ravenburg, chief clerk hospital corps division; Mr. C. J. Myers and Mr. F. W. Stone, of the museum and library division. Mr. Frank Coburn, who has been my personal stenographer and typewriter during the entire period of my incumbency of the office of Surgeon-General, has performed his responsible duties in a most satisfactory manner, and I desire to testify as to my appreciation of his efficient and faithful services.

In conclusion, I desire to ask for the medical corps of the Army the kindly interest of the Congress of the United States, of the honorable the Secretary of War, and of all general officers of the Army. History has amply demonstrated the fact that infectious diseases are often more fatal to the success of armies than the military operations of the enemy. Modern sanitary science justly claims that infectious diseases, such as smallpox, typhoid fever, yellow fever, cholera, bubonic plague, etc., are to a large extent preventable diseases. Special attention is given in the examination of candidates for the medical corps and in their subsequent training at the Army Medical School to questions relating to the cause and prevention of infectious diseases and to hygiene in general, and they are constantly made to feel their responsibility as guardians of the health of the commands to which they are attached. Evidently the prevention of disease among our soldiers is of paramount importance, and the medical corps can point with pride to the great reduction in the mortality and nonefficiency rates among our troops during the period from 1866 to 1897. Unfortunately, this record was broken during the Spanish-American war by the epidemic prevalence of typhoid fever in nearly all of our camps within the limits of the United States. The causes for this discreditable state of affairs are set forth in my paper entitled "Sanitary lessons of the war" (published in 1899), from which I beg leave to quote the following passages:

The medical officers of regiments were appointed by the governors of States and, as a rule, were competent professionally, but they were called upon to assume new responsibilities for which they had no special training. Unfortunately, hygiene and practical sanitation are subjects which receive little attention in our medical schools or from physicians and surgeons engaged in the practice of medicine. But even in those cases in which the regimental surgeon was fully aware of the importance of camp sanitation and urgent in his sanitary recommendations he was unable to control the sanitary situation unless the regimental and company officers enforced the necessary measures for protecting the health of the command. And just here is the fundamental difficulty when we are dealing with new levies of troops. The officers and enlisted men of our volunteer regiments were, as a rule, intelligent, patriotic, and brave, but they were not disciplined. Each man was in the habit of judging for himself and of acting in accordance with his individual judgment. Discipline consists essentially in an unquestioning obedience of orders from those having proper authority to give them. Trained officers can not at once establish discipline among untrained troops, and when both officers and enlisted men are without military experience it is evident that, with the best material, time will be required for the establishment of discipline, and in the absence of discipline it is impracticable to enforce proper sanitary regulations in camp. The Surgeon-General may formulate sanitary regulations and the general commanding an army corps or a division may issue the necessary orders, but in the absence of discipline these orders will not be enforced. A reckless recruit will drink the water which has been condemned as unsafe and at night will defile the ground in the vicinity of his tent rather than visit the company sink, which, possibly, is in a disgusting and unsanitary condition because of a failure to carry out the orders to cover the surface of excreta "with fresh earth or quicklime or ashes three times a day."

New levies of troops are especially subject to typhoid fever and other infectious camp diseases, not only because of a lack of discipline and consequent difficulty in the enforcement of necessary sanitary regulations, but also because the individual soldiers are very susceptible to infection, owing to their age, the abrupt change in their mode of life, the exposure and fatigue incident to camp life, and last, but not least, their own imprudence as regards eating, drinking, exercise, etc.

The value of experience and special training is recognized in all departments of human activity, and the military calling furnishes no exception to the general rule. This applies to the staff as well as to the line, and the medical staff is no exception. When, therefore, I say that the evils resulting from neglect of camp sanitation during the earlier months of the war were to some extent due to the inexperience of the regimental surgeons, I am not reflecting upon the professional qualifications of these gentlemen, but am simply stating a fact.

There has been no failure upon the part of the medical department of the volunteer army to accomplish all that could have been reasonably expected of it, but without doubt an adequate number of thoroughly trained medical officers could have done much at the outset of the war in the way of preventing the introduction and extension of typhoid fever in our camps, and in organizing and administering field hospitals, ambulance companies, etc.

Finally, the principal lessons to be derived from our recent experience may be stated as follows:

A trained medical corps, hardly adequate for an army of 25,000 men, can not control the sanitary situation when this army is quickly expanded to 250,000. Physicians and surgeons from civil life, however well qualified professionally, as a rule are not prepared to assume the responsibilities of medical officers charged with administrative duties and the sanitary supervision of camps. The proper performance of such duties can not be expected from a physician without military training or experience, no matter how distinguished a position he may have held in civil life.

Courage and patriotism on the part of line officers and enlisted men can not take the place of knowledge and experience; new levies of troops are, as a rule, ignorant of the first principles of camp sanitation and reckless as to the consequences of their neglect of prescribed sanitary regulations. Therefore training and discipline are essential factors in the preservation of the health of soldiers in garrison or in the field.

The value of the aphorism "In time of peace prepare for war" has received additional support. This preparation should include a corps of trained medical officers larger than is absolutely necessary for the Army on a peace basis, and systematic instruction in military medicine and hygiene for the medical officers of the National Guard as well as for those of the Regular Army; also instruction of line officers in the elements of hygiene and especially in camp sanitation. It should also include the establishment of camping grounds in various parts of the country, having an ample supply of pure water, a proper system of sewers, etc. If our volunteers could have been assembled in such camps during the late war a saving in lives and money would have resulted which would without doubt have demonstrated the economy of such preparation for war in time of peace.

With reference to the subsequent sanitary history of our troops, I again point with pride to the reports in the present volume relating to health conditions in the United States, and especially in our island possessions. I believe that new levies of troops serving in a tropical country have never, in the history of the world, had so good a health record as that shown by these reports for the troops stationed in the Philippine Islands, in Cuba, and in Porto Rico. My recent inspecting trip to the Philippine Islands has convinced me that when proper sanitary regulations are enforced the health of troops stationed in these islands will be quite as good as if they were stationed in our own "Gulf States." I would say further, with reference to this trip, that I found wherever I went well-equipped hospitals, ample and efficient medical attendance, and an abundance of medical supplies of all kinds.

STATISTICAL TABLES.

The following statistical tables give in detail the data on which the statements of this report are based. They are:

I. Numerical view of the effects of disease and injury on the Army during the calendar year 1900, as compared with the corresponding data for 1899 and for the decade 1889–1898.

II. Numerical view of the effects of disease and injury on the United States forces doing insular and home service in 1900, as compared with corresponding data for 1899.

III. Armies, Regular and Volunteer, 1900; admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, as compared with the corresponding ratios of the Regular Army for the decade 1889–1898.

IV. Armies, Regular and Volunteer, 1900; admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by the countries in which service was rendered. (All the volunteer troops in service during the year were on duty in the Division of the Philippines.)

V. Armies, Regular and Volunteer, 1900; admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by arms of the service.

INTERNATIONAL TABLES.

I. Examination of recruits during the year 1900.

III. Movements of sick by branches of military service and by months, Volunteers and Regulars, 1900.

VI. Admissions of important diseases by branches of the military service, Volunteers and Regulars, 1900.

VII. Admissions of important diseases by months, absolute numbers, Volunteers and Regulars, 1900.

It has not been practicable during the past year to gather the data necessary for the presentation of Tables II, IV, V, and VIII of the international series.

TABLE I.—*Numerical view of the effects of disease and injury on the Army during the calendar year 1900, as compared with the corresponding data for 1899 and for the decade 1889–1898.*

	United States Army.					
	Volunteers.	Regulars.	Total.	White.	Colored.	Indian.
Mean strength	31,434	68,955	100,389	92,374	8,015	.....
Total admissions to sick report	92,102	139,978	232,080	217,319	14,761	.....
Per 1,000 of mean strength	2,930.01	2,029.99	2,311.81	2,352.60	1,841.67	.....
Per 1,000 for previous year	1,522.33	2,342.26	2,178.06	2,175.47	2,214.88	.....
Per 1,000 for preceding decade	.....	1,280.19	1,280.19	1,280.37	1,293.60	1,115.42
Admissions for disease	86,814	125,563	212,377	199,340	13,037	.....
Per 1,000 of mean strength	2,761.79	1,820.94	2,115.54	2,157.97	1,626.57	.....
Per 1,000 for previous year	1,407.28	2,125.74	1,985.58	1,986.51	1,972.08	.....
Per 1,000 for preceding decade	.....	1,047.44	1,047.44	1,050.52	1,033.74	832.16
Admissions for injury	5,288	14,415	19,703	17,979	1,724	.....
Per 1,000 of mean strength	168.23	209.05	196.27	194.63	215.10	.....
Per 1,000 for previous year	115.05	216.52	192.48	188.95	242.80	.....
Per 1,000 for preceding decade	.....	232.75	232.75	229.85	259.86	283.28
Discharges for disability, all causes	408	1,861	2,269	2,133	136	.....
Per 1,000 of mean strength	12.98	26.99	22.60	23.09	16.97	.....
Per 1,000 for previous year	12.70	27.42	21.98	21.98	21.99	.....
Per 1,000 for preceding decade	.....	14.79	14.79	14.74	14.43	24.21
Discharges for disease	321	1,457	1,778	1,670	108	.....
Per 1,000 of mean strength	10.21	21.13	17.71	18.08	13.47	.....
Per 1,000 for previous year	10.45	21.65	17.51	17.50	17.65	.....
Per 1,000 for preceding decade	.....	11.68	11.68	11.62	11.47	21.57
Discharges for injury	87	404	491	463	28	.....
Per 1,000 of mean strength	2.77	5.86	4.89	5.01	3.49	.....
Per 1,000 for previous year	2.25	5.77	4.47	4.48	4.34	.....
Per 1,000 for preceding decade	.....	3.10	3.10	3.12	2.96	2.64
Deaths from all causes	1,138	1,145	2,283	2,105	178	.....
Per 1,000 of mean strength	36.20	16.61	22.74	22.79	22.21	.....
Per 1,000 for previous year	7.26	18.65	18.43	18.55	16.64	.....
Per 1,000 for preceding decade	.....	9.83	9.83	9.68	10.77	16.72
Deaths from disease	784	801	1,585	1,465	120	.....
Per 1,000 of mean strength	24.94	11.62	15.79	15.86	14.97	.....
Per 1,000 for previous year	6.32	12.75	11.76	11.85	10.42	.....
Per 1,000 for preceding decade	.....	7.08	7.08	7.01	7.65	9.68
Deaths from injury	354	344	698	640	58	.....
Per 1,000 of mean strength	11.26	4.99	6.95	6.93	7.24	.....
Per 1,000 for previous year	.94	5.90	6.67	6.70	6.22	.....
Per 1,000 for preceding decade	.....	2.74	2.74	2.67	3.12	7.04

TABLE II.—*Numerical view of the effects of disease and injury on the United States forces doing insular and home service in 1900, as compared with corresponding data for 1899.*

	Cuba.	Porto Rico.	Pacific islands.			China.	Total islands and China.			United States (continental).
			Volunteers.	Regulars.	Total.		Volunteers.	Regulars.	Total.	
Mean strength	8,690	2,180	31,434	35,448	66,882	1,947	31,434	48,265	79,699	20,690
Total admissions to sick report	16,277	3,440	92,102	83,260	175,362	5,739	92,102	108,716	200,818	31,262
Per 1,000 of mean strength	1,873.07	1,577.98	2,930.01	2,348.79	2,621.96	2,947.61	2,930.01	2,252.49	2,519.70	1,510.97
Per 1,000 for previous year	2,749.74	2,522.40	2,065.65	2,630.92	2,395.52	.....	2,180.87	2,732.99	2,515.65	1,677.51
Admissions for disease	13,784	3,047	86,814	77,905	164,719	5,112	86,814	99,848	186,662	25,715
Per 1,000 of mean strength	1,586.19	1,397.71	2,761.79	2197.73	2,462.83	2,625.58	2,761.79	2,068.75	2,342.09	1,242.87
Per 1,000 for previous year	2,537.98	2,255.97	1,859.21	2,454.10	2,206.36	.....	1,999.57	2,519.33	2,314.74	1,496.84
Admissions for injury	2,493	393	5,288	5,355	10,643	627	5,288	8,868	14,156	5,547
Per 1,000 of mean strength	286.88	180.27	168.23	151.06	159.13	322.03	168.23	183.74	177.62	268.10
Per 1,000 for previous year	211.76	266.43	206.44	176.82	189.16	.....	181.27	213.66	200.91	180.67
Discharges for disability, all causes	144	33	408	796	1,204	75	408	1,048	1,456	813
Per 1,000 of mean strength	16.57	15.14	12.98	22.46	18	38.52	12.98	21.71	18.27	39.29
Per 1,000 for previous year	20.25	19.85	14.92	19.89	17.82	.....	13.98	21.79	18.71	26.95
Discharges for disease	115	30	321	604	925	35	321	784	1,105	673
Per 1,000 of mean strength	13.23	13.76	10.21	17.04	13.83	17.98	10.21	16.24	13.86	32.52
Per 1,000 for previous year	16.26	16.63	11.62	14.26	13.16	.....	11.40	16.26	14.35	22.28
Discharges for injury	29	3	87	192	279	40	87	264	351	140
Per 1,000 of mean strength	3.34	1.38	2.77	5.42	4.17	20.54	2.77	5.47	4.40	6.77
Per 1,000 for previous year	3.99	3.22	3.30	5.63	4.66	.....	2.58	5.52	4.36	4.67
Deaths from all causes	85	11	1,138	785	1,923	93	1,138	984	2,122	161
Per 1,000 of mean strength	9.78	5.05	36.20	22.15	28.75	47.76	36.20	20.39	26.63	7.78
Per 1,000 for previous year	18.30	11.27	29.83	31.10	30.58	.....	25.18	25.76	25.53	7.89
Deaths from disease	73	11	784	571	1,355	46	784	701	1,485	100
Per 1,000 of mean strength	8.40	5.05	24.94	16.11	20.26	23.62	24.94	14.52	18.63	4.83
Per 1,000 for previous year	16.36	9.12	11.80	17.80	15.30	.....	12.77	16.89	15.27	6.56
Deaths from injury	12	.....	354	214	568	47	354	283	637	61
Per 1,000 of mean strength	1.38	.....	11.26	6.04	8.49	24.14	11.26	5.86	7.99	2.95
Per 1,000 for previous year	1.94	2.15	18.03	13.30	15.28	.....	12.41	8.87	10.26	1.33

TABLE III.—*Armies, Regular and Volunteer, 1900—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, as compared with the corresponding ratios of the Regular Army for the decade 1889–1898.*

Year 1900.	Army, Regulars and Volunteers.						White troops, Regulars and Volunteers.						Colored troops, Regulars and Volunteers.					
Mean strength	100,389						92,374						8,015					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	6	0.06	.....	.....	1	0.01	6	0.06	.....	.....	1	0.01	.....	.....	.....	.....	.....	.....
Measles	568	5.66	.....	.....	7	.07	543	5.88	.....	.....	7	.08	25	3.12	.....	.....	.....	.....
Smallpox	261	2.60	.....	.....	114	1.14	176	1.91	.....	.....	73	.79	85	10.60	.....	.....	41	5.12
Vaccinia	2,036	20.28	.....	.....	.....	.....	1,911	20.69	.....	.....	.....	.....	125	15.60	.....	.....	.....	.....
Influenza	1,632	16.26	.....	.....	1	.01	1,582	17.13	.....	.....	1	.01	50	6.24	.....	.....	.....	.....
Dengue	3,321	33.08	.....	.....	.....	.....	3,249	35.17	.....	.....	.....	.....	72	8.98	.....	.....	.....	.....
Mumps	569	5.67	.....	.....	.....	.....	522	5.65	.....	.....	.....	.....	47	5.86	.....	.....	.....	.....
Diphtheria	45	.45	.....	.....	4	.04	43	.47	.....	.....	4	.04	2	.25	.....	.....	.....	.....
Typhoid fever	978	9.74	3	0.03	164	1.63	943	10.21	3	0.03	154	1.67	31	3.87	.....	.....	10	1.25
Yellow fever	144	1.43	.....	.....	32	.32	148	1.60	.....	.....	32	.35	.....	.....	.....	.....	.....	.....
Cerebrospinal fever	11	.11	.....	.....	10	.10	11	.12	.....	.....	10	.11	.....	.....	.....	.....	.....	.....
Malarial fever, intermittent	55,814	555.98	2	.02	.....	.....	52,589	569.31	2	.02	.....	.....	3,225	402.37	.....	.....	.....	.....
Malarial fever, remittent	11,831	117.85	.....	.....	25	.25	11,355	122.92	.....	.....	23	.25	476	59.39	.....	.....	2	.25
Malarial fever, pernicious	220	2.19	1	.01	96	.96	210	2.27	1	.01	99	.97	10	1.25	.....	.....	6	.75
Malarial cachexia	3,062	30.50	40	.40	15	.15	2,957	32.01	39	.42	15	.16	105	13.10	1	0.12	.....	.....
Fever, undetermined	2,223	22.15	.....	.....	2	.02	2,088	22.60	.....	.....	2	.02	135	16.84	.....	.....	.....	.....
Erysipelas	105	1.05	.....	.....	1	.01	101	1.09	.....	.....	1	.01	4	.50	.....	.....	.....	.....
Septicæmia and tetanus	32	.32	1	.01	20	.20	27	.29	1	.01	19	.21	5	.62	.....	.....	1	.12
Rheumatic fever	433	4.31	2	.02	1	.01	399	4.32	2	.02	.....	.....	34	1.24	.....	.....	1	.12
Consumption	494	4.92	137	1.36	96	.96	448	4.85	123	1.33	81	.91	46	5.74	14	1.75	12	1.50
Cancer	16	.16	3	.03	1	.01	16	.17	3	.03	1	.01	.....	.....	.....	.....	.....	.....
Syphilis and results	1,589	15.83	174	1.73	5	.05	1,463	15.84	160	1.73	5	.05	126	15.72	14	1.75	.....	.....
Gonorrhœa and results	7,899	78.69	58	.58	.....	.....	7,223	78.19	55	.60	.....	.....	676	84.33	3	.37	.....	.....
Chancroid and results	3,960	39.45	5	.05	1	.01	3,524	38.15	2	.02	.....	.....	436	54.40	3	.37	1	.12
Infections, other	153	1.52	9	.09	6	.06	142	1.54	9	.10	4	.04	11	1.37	.....	.....	2	.25
Total infectious diseases	97,402	970.24	435	4.33	602	6.00	91,676	992.13	400	4.33	529	5.69	5,726	714.41	35	4.37	76	9.48
Anemia	496	4.94	4	.04	6	.06	486	5.26	3	.03	6	.06	10	1.25	1	.12	.....	.....
Nutrition, others	114	1.14	56	.56	1	.01	110	1.19	54	.58	1	.01	4	.50	2	.25	.....	.....
Total diseases of nutrition	610	6.08	60	.60	7	.07	596	6.45	57	.62	7	.08	14	1.75	3	.37	.....	.....

TABLE III.—*Armies, Regular and Volunteer, 1900—Admissions to sick report, discharges, and deaths from various causes, etc.*—Continued.

Year 1900.	Army, Regulars and Volunteers.						White troops, Regulars and Volunteers.						Colored troops, Regulars and Volunteers.					
Mean strength	100,389						92,374						8,015					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Alcoholism	1,540	15.34	13	0.13	18	0.18	1,502	16.26	13	0.14	17	0.18	38	4.74	.....	.....	1	0.12
Brain and spinal cord	395	3.93	99	.99	17	.17	357	3.87	96	1.04	16	.17	38	4.74	3	0.37	1	.12
Insanity	273	2.72	149	1.48	3	.03	248	2.68	139	1.50	3	.03	25	3.12	10	1.25	.....	.....
Meningitis	26	.26	1	.01	5	.05	25	.27	1	.01	5	.05	1	.12	.....	.....	.....	.....
Poisoning, narcotic	74	.74	7	.07	9	.09	72	.78	7	.08	9	.10	2	.25	.....	.....	.....	.....
Nervous system, others	2,639	26.29	65	.65	5	.05	2,288	24.77	61	.66	5	.05	351	43.79	4	.50	.....	.....
Total diseases of the nervous system	4,947	49.28	334	3.33	57	.57	4,492	48.63	317	3.43	55	.60	455	56.77	17	2.12	2	.25
Poisoning, irritant	285	2.84	2	.02	3	.03	273	2.96	2	.02	3	.03	12	1.50	.....	.....	.....	.....
Tonsillitis, pharyngitis, and sore throat	3,520	35.06	.....	.....	.....	.....	3,200	34.64	.....	.....	.....	.....	320	39.92	.....	.....	.....	.....
Peritonitis	29	.29	.....	.....	15	.15	27	.29	.....	.....	15	.16	2	.25	.....	.....	.....	.....
Dyspepsia, colic, and constipation	8,700	86.67	7	.07	.....	.....	7,797	84.41	7	.08	.....	.....	903	112.65	.....	.....	.....	.....
Gastritis	3,611	35.97	20	.20	4	.04	3,467	37.53	20	.22	4	.04	144	17.97	.....	.....	.....	.....
Dysentery, acute	6,339	63.15	7	.07	229	2.28	5,946	64.37	7	.08	218	2.36	393	49.03	.....	.....	11	1.37
Dysentery, chronic	3,180	31.68	111	1.11	336	3.35	3,026	32.76	111	1.20	327	3.54	154	19.21	.....	.....	9	1.12
Diarrheal diseases, others	37,161	370.18	63	.63	84	.84	35,636	385.78	63	.68	84	.91	1,525	190.26	.....	.....	.....	.....
Enteritis	1,598	15.92	18	.18	29	.29	1,459	15.79	18	.19	29	.31	139	17.34	.....	.....	.....	.....
Perityphlitis and appendicitis	259	2.58	9	.09	20	.20	240	2.60	8	.09	15	.16	19	2.37	1	.12	5	.62
Digestive system, others	4,461	44.44	54	.54	38	.38	4,128	44.69	53	.57	36	.39	333	41.55	1	.12	2	.25
Total diseases of the digestive system	69,143	688.75	291	2.90	758	7.55	65,199	705.82	289	3.13	731	7.91	3,944	492.08	2	.25	27	3.37
Heart, diseases of	524	5.22	85	.85	43	.43	486	5.26	77	.83	39	.42	38	4.74	8	1	4	.50
Arteries and veins	216	2.15	32	.32	7	.07	205	2.22	32	.35	5	.05	11	1.37	.....	.....	2	.25
Total diseases of the circulatory system	740	7.37	117	1.17	50	.50	691	7.48	109	1.18	44	.48	49	6.11	8	1	6	.75
Bronchitis	4,874	48.55	12	.12	.....	.....	4,487	48.58	12	.13	.....	.....	387	48.28	.....	.....	.....	.....
Pneumonia	270	2.69	2	.02	40	.40	242	2.62	2	.02	38	.41	28	3.49	.....	.....	2	.25
Pleurisy	409	4.07	20	.20	7	.07	369	3.99	19	.21	5	.05	40	4.99	1	.12	2	.25
Respiratory system, others	2,125	21.17	25	.25	9	.09	2,029	21.97	21	.23	7	.08	96	11.98	4	.50	2	.25
Total diseases of the respiratory system	7,678	76.48	59	.59	56	.56	7,127	77.16	54	.58	50	.54	551	68.75	5	.62	6	.75

Kidneys, diseases of	370	3.69	32	.32	47	.47	342	3.70	31	.34	44	.48	28	3.49	1	.12	3	.37
Varicocele	392	3.91	21	.21	.....	.....	381	4.12	21	.23	.....	.....	11	1.37	.....	.....	.....	.....
Genito-urinary, others	1,168	11.64	22	.22	1	.01	1,071	11.59	20	.22	1	.01	97	12.10	2	.25	.....	.....
Total diseases of the genito-urinary system	1,930	19.23	75	.75	48	.48	1,794	19.42	72	.78	45	.49	136	16.97	3	.37	3	.37
Adenitis	742	7.39	5	.05	.....	.....	673	7.29	4	.04	.....	.....	69	8.61	1	.12	.....	.....
Lymphatic system, others	97	.97	3	.03	1	.01	90	.97	2	.02	1	.01	7	.87	1	.12	.....	.....
Total diseases of the lymphatic system	839	8.36	8	.08	1	.01	763	8.26	6	.06	1	.01	76	9.48	2	.25	.....	.....
Rheumatism, muscular	3,989	39.74	22	.22	.....	.....	3,505	37.95	20	.22	.....	.....	484	60.39	2	.25	.....	.....
Osteitis and periostitis	193	1.92	8	.08	.....	.....	174	1.88	7	.08	.....	.....	19	2.37	1	.12	.....	.....
Arthritis and synovitis	932	9.28	26	.26	1	.01	831	9.00	24	.26	1	.01	101	12.60	2	.25	.....	.....
Rheumatism, chronic articular	676	6.73	66	.66	.....	.....	593	6.42	60	.65	.....	.....	83	10.35	6	.75	.....	.....
Muscles, bones, and joints, others	452	4.50	50	.50	.....	.....	412	4.46	44	.48	.....	.....	40	4.99	6	.75	.....	.....
Total diseases of the muscles, bones, and joints	6,242	62.18	172	1.71	1	.01	5,515	59.71	155	1.68	1	.01	727	90.70	17	2.12	.....	.....
Total diseases of the integumentary system	18,856	187.84	10	.10	1	.01	17,880	193.58	8	.09	1	.01	976	121.77	2	.25	.....	.....
Total diseases of the eye	1,528	15.22	95	.95	.....	.....	1,390	15.05	88	.95	.....	.....	138	17.22	7	.87	.....	.....
Total diseases of the ear	1,561	15.55	111	1.11	.....	.....	1,515	16.40	107	1.16	.....	.....	46	5.74	4	.50	.....	.....
Total diseases of the nose	107	1.07	11	.11	.....	.....	99	1.07	8	.09	.....	.....	8	1.00	3	.37	.....	.....
Total unclassified and undiagnosed	794	7.91	.....	.....	4	.04	603	6.53	.....	.....	1	.01	191	23.83	.....	.....	.....	.....
Total for diseases	212,377	2,115.54	1,778	17.71	1,585	15.79	199,340	2,157.97	1,670	18.08	1,465	15.86	13,037	1,626.57	108	13.48	120	14.97
Drowning	7	.07	.....	.....	116	1.16	7	.08	.....	.....	98	1.06	.....	.....	.....	.....	18	2.25
Exhaustion from exposure and fatigue	750	7.47	2	.02	2	.02	714	7.73	2	.02	2	.02	36	4.49	.....	.....	.....	.....
Heat stroke	195	1.94	8	.08	9	.09	188	2.04	7	.08	7	.08	7	.87	1	.12	2	.25
Lightning stroke	4	.04	.....	.....	.....	.....	3	.03	.....	.....	.....	.....	1	.12	.....	.....	.....	.....
Venomous bites, stings, and wounds	855	8.52	3	.03	1	.01	821	8.89	3	.03	.....	.....	34	4.24	.....	.....	1	.12
Abrasions, blisters, burns, and scalds	2,515	25.05	.....	.....	1	.01	2,371	25.67	.....	.....	1	.01	144	17.97	.....	.....	.....	.....
Compression and concussion of brain	38	.38	3	.03	4	.04	37	.40	3	.03	3	.03	1	.12	.....	.....	1	.12
Contusions and sprains	7,572	75.42	4	.04	.....	.....	6,800	73.61	4	.04	.....	.....	772	96.32	.....	.....	.....	.....
Dislocations	267	2.66	9	.09	.....	.....	246	2.66	8	.09	.....	.....	21	2.62	1	.12	.....	.....
Fractures (not shot)	710	7.07	41	.41	11	.11	678	7.34	42	.45	11	.12	32	3.99	2	.25	.....	.....
Hernia	592	5.90	102	1.02	.....	.....	557	6.03	96	1.04	.....	.....	35	4.37	6	.75	.....	.....
Wounds, contused, lacerated, and punctured	2,352	23.43	6	.06	5	.05	2,082	22.54	6	.06	4	.04	270	33.69	.....	.....	1	.12
Wounds, incised	1,257	12.52	6	.06	58	.58	1,132	12.25	6	.06	56	.61	125	15.59	.....	.....	2	.25
Wounds, gunshot	1,173	11.69	235	2.34	471	4.69	1,089	11.79	221	2.39	439	4.75	84	10.48	14	1.75	32	3.99
Secondary results of injury	140	1.38	58	.58	2	.02	405	4.38	55	.60	1	.01	35	4.37	3	.37	1	.12
Other injuries	976	9.72	11	.11	18	.18	849	9.19	10	.11	18	.19	127	15.84	1	.12	.....	.....
Total for injuries	19,703	196.27	491	4.89	698	6.95	17,979	194.63	463	5.01	640	6.93	1,724	215.10	28	3.49	58	7.24
Total for diseases and injuries	232,080	2,311.81	2,269	22.60	2,283	22.74	217,319	2,352.60	2,133	23.09	2,105	22.79	14,761	1,841.67	136	16.97	178	22.21

TABLE III.—*Armies, Regular and Volunteer, 1900—Admissions to sick report, discharges, and deaths from various causes, etc.*—Continued.

Year 1900.	Regular Army.						White troops, Regulars.						Colored troops, Regulars.					
Mean strength	68,955						63,581						5,374					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	5	0.07	.....	.....	1	0.01	5	0.08	.....	.....	1	0.02	.....	.....	.....	.....	.....	.....
Measles	311	4.51	.....	.....	2	.03	304	4.78	.....	.....	2	.03	7	1.30	.....	.....	.....	.....
Smallpox	95	1.38	.....	.....	24	.35	75	1.18	.....	.....	15	.24	20	3.72	.....	.....	9	1.67
Vaccinia	1,708	24.77	.....	.....	.....	.....	1,599	25.15	.....	.....	.....	.....	109	20.28	.....	.....	.....	.....
Influenza	1,371	19.88	.....	.....	1	.01	1,322	20.79	.....	.....	1	.02	49	9.12	.....	.....	.....	.....
Dengue	1,500	21.75	.....	.....	.....	.....	1,468	23.09	.....	.....	.....	.....	32	5.95	.....	.....	.....	.....
Mumps	268	3.89	.....	.....	.....	.....	242	3.81	.....	.....	.....	.....	26	4.84	.....	.....	.....	.....
Diphtheria	34	.49	.....	.....	2	.03	32	.50	.....	.....	2	.03	2	.37	.....	.....	.....	.....
Typhoid fever	531	7.70	2	0.03	60	.87	506	7.96	2	0.03	52	.82	25	4.65	.....	.....	8	1.49
Yellow fever	148	2.15	.....	.....	32	.46	148	2.33	.....	.....	32	.52	.....	.....	.....	.....	.....	.....
Cerebro spinal fever	5	.07	.....	.....	5	.07	5	.08	.....	.....	5	.08	.....	.....	.....	.....	.....	.....
Malarial fever, intermittent	27,670	401.28	2	.03	.....	.....	25,279	397.59	2	.03	.....	.....	2,391	444.92	.....	.....	.....	.....
Malarial fever, remittent	6,916	100.30	.....	.....	14	.20	6,497	102.18	.....	.....	14	.22	419	77.97	.....	.....	.....	.....
Malarial fever, pernicious	109	1.58	1	.01	54	.78	104	1.64	1	.02	52	.82	5	.93	.....	.....	2	.37
Malarial cachexia	1,380	20.01	31	.45	6	.09	1,283	20.18	30	.47	6	.09	97	18.05	1	0.19	.....	.....
Fever, undetermined	1,354	19.64	.....	.....	2	.03	1,254	19.72	.....	.....	2	.03	100	18.61	.....	.....	.....	.....
Erysipelas	85	1.23	.....	.....	.....	.....	81	1.27	.....	.....	.....	.....	4	.74	.....	.....	.....	.....
Septicæmia and tetanus	21	.30	1	.01	13	.19	19	.30	1	.02	13	.20	2	.37	.....	.....	.....	.....
Rheumatic fever	280	4.06	2	.03	1	.01	259	4.07	2	.03	.....	.....	21	3.91	.....	.....	1	.19
Consumption	334	4.84	116	1.68	52	.75	305	4.80	103	1.62	47	.74	29	5.40	13	2.42	5	.93
Cancer	12	.17	3	.04	1	.01	12	.19	3	.05	1	.02	.....	.....	.....	.....	.....	.....
Syphilis and results	1,273	18.46	163	2.36	3	.04	1,173	18.45	150	2.36	3	.05	100	18.61	13	2.42	.....	.....
Gonorrhea and results	6,460	93.68	57	.83	.....	.....	5,909	92.93	54	.85	.....	.....	551	102.53	3	.56	.....	.....
Chancroid and results	3,202	46.44	4	.06	.....	.....	2,897	45.56	1	.02	.....	.....	305	56.76	3	.56	.....	.....
Infections, other	114	1.65	8	.12	5	.07	110	1.73	8	.13	4	.06	4	.74	.....	.....	1	.19
Total infectious diseases	55,186	800.32	390	5.66	278	4.03	50,888	800.36	357	5.61	252	3.96	4,298	799.78	33	6.14	26	4.84
Anemia	255	3.70	4	.06	3	.04	247	3.88	3	.05	3	.05	8	1.49	1	.19	.....	.....
Nutrition, others	95	1.38	53	.77	.....	.....	91	1.43	51	.80	.....	.....	4	.74	2	.37	.....	.....
Total diseases of nutrition	350	5.08	57	.83	3	.04	338	5.32	54	.85	3	.05	12	2.23	3	.56	.....	.....
Alcoholism	1,267	18.38	12	.17	12	.17	1,231	19.36	12	.19	12	.19	36	6.70	.....	.....	.....	.....
Brain and spinal cord	269	3.90	81	1.17	13	.19	246	3.87	78	1.23	13	.20	23	4.28	3	.56	.....	.....
Insanity	150	2.18	110	1.60	2	.03	136	2.14	102	1.60	2	.03	14	2.61	8	1.49	.....	.....
Meningitis	14	.20	.....	.....	2	.03	13	.20	.....	.....	2	.03	1	.19	.....	.....	.....	.....

Poisoning, narcotic	60	.87	7	.10	6	.09	58	.91	7	.11	6	.09	2	.37				
Nervous system, others	1,950	28.28	51	.74	4	.06	1,708	26.86	48	.75	4	.06	242	45.03	3	.56		
Total diseases of the nervous system	3,710	53.80	261	3.79	39	.57	3,392	53.35	247	3.88	39	.61	318	59.17	14	2.61		
Poisoning, irritant	268	3.89	2	.03	3	.04	260	4.09	2	.03	3	.05	8	1.49				
Tonsillitis, pharyngitis, and sore throat	2,822	40.93					2,554	40.17					268	49.87				
Peritonitis	18	.26			7	.10	16	.25			7	.11	2	.37				
Dyspepsia, colic, and constipation	5,887	85.38	5	.07			5,208	81.91	5	.08			679	126.35				
Gastritis	2,065	29.95	15	.22	2	.03	1,950	30.67	15	.24	2	.03	115	21.40				
Dysentery, acute	3,398	49.28	7	.10	93	1.35	3,141	49.40	7	.11	87	1.37	257	47.82			6	1.12
Dysentery, chronic	1,559	22.61	86	1.25	182	2.64	1,415	22.25	86	1.35	173	2.72	144	26.80			9	1.67
Diarrhœal diseases, others	18,586	269.54	47	.68	32	.46	17,571	276.35	47	.74	32	.50	1,015	188.89				
Enteritis	1,166	16.91	9	.13	20	.29	1,045	16.43	9	.14	20	.31	121	22.52				
Perityphlitis and appendicitis	179	2.60	8	.12	11	.16	167	2.63	8	.13	9	.14	12	2.23			2	.37
Digestive system, others	2,846	41.28	47	.68	27	.39	2,585	40.66	46	.72	26	.41	261	48.57	1	.19	1	.19
Total diseases of the digestive system	38,794	562.60	226	3.28	377	5.47	35,912	564.82	225	3.54	359	5.65	2,882	536.29	1	.19	18	3.35
Heart, diseases of	380	5.51	75	1.09	37	.54	343	5.39	67	1.05	33	.52	37	6.89	8	1.49	4	.74
Arteries and veins	144	2.09	27	.39	6	.09	135	2.12	27	.42	4	.06	9	1.67			2	.37
Total diseases of the circulatory system	524	7.60	102	1.48	43	.62	478	7.53	94	1.48	37	.58	46	8.56	8	1.49	6	1.12
Bronchitis	3,472	50.36	9	.13			3,155	49.62	9	.14			317	58.99				
Pneumonia	188	2.73	1	.01	16	.23	172	2.71	1	.02	15	.24	16	2.98			1	.19
Pleurisy	289	4.19	15	.22	4	.06	264	4.15	14	.22	3	.05	25	4.65	1	.19	1	.19
Respiratory system, others	1,570	22.77	20	.29	4	.06	1,503	23.64	17	.27	4	.06	67	12.47	3	.56		
Total diseases of the respiratory system	5,519	80.04	45	.65	24	.35	5,094	80.12	41	.64	22	.35	425	79.08	4	.74	2	.37
Kidneys, diseases of	248	3.60	27	.39	30	.44	232	3.65	26	.41	28	.44	16	2.98	1	.19	2	.37
Varicocele	281	4.08	21	.30			274	4.31	21	.33			7	1.30				
Genito-urinary, others	792	11.49	21	.30			725	11.40	19	.30			67	12.47	2	.37		
Total diseases of the genito-urinary system	1,321	19.16	69	1.00	30	.44	1,231	19.36	66	1.04	28	.44	90	16.75	3	.56	2	.37
Adenitis	542	7.86	5	.07			488	7.68	4	.06			54	10.05	1	.19		
Lymphatic system, others	63	.91	1	.01	1	.01	59	.93	1	.02	1	.02	4	.74				
Total diseases of the lymphatic system	605	8.77	6	.09	1	.01	547	8.60	5	.08	1	.02	58	10.79	1	.19		
Rheumatism, muscular	2,869	41.61	18	.26			2,464	38.75	16	.25			405	75.37	2	.37		
Osteitis and periostitis	128	1.86	7	.10			115	1.81	6	.09			13	2.42	1	.19		
Arthritis and synovitis	684	9.92	21	.30	1	.01	608	9.56	19	.30	1	.02	76	14.14	2	.37		
Rheumatism, chronic articular	490	7.11	47	.68			431	6.78	43	.68			59	10.98	4	.74		
Muscles, bones, and joints, others	377	5.47	38	.55			340	5.35	33	.52			37	6.89	5	.93		
Total diseases of the muscles, bones, and joints	4,548	65.96	131	1.90	1	.01	3,958	62.25	117	1.84	1	.02	590	109.79	14	2.61		

TABLE III.—*Armies, Regular and Volunteer, 1900—Admissions to sick report, discharges, and deaths from various causes, etc.*—Continued.

Year 1900.	Regular Army.						White troops Regulars.						Colored troops, Regulars.					
Mean strength	68,955						63,581						5,374					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Total diseases of the integumentary system	12,482	181.03	10	0.15	1	0.01	11,769	185.10	8	0.13	1	0.02	713	132.67	2	0.37	.....	.....
Total diseases of the eye	1,082	15.69	75	1.09	.....	.....	962	15.13	70	1.10	.....	.....	120	22.33	5	.93	.....	.....
Total diseases of the ear	976	14.16	76	1.10	.....	.....	946	14.88	73	1.15	.....	.....	30	5.58	3	.56	.....	.....
Total diseases of the nose	84	1.22	9	.13	.....	.....	78	1.23	6	.09	.....	.....	6	1.12	3	.56	.....	.....
Total unclassified and undiagnosed	382	5.54	.....	.....	4	.06	194	3.05	.....	.....	4	.06	188	34.98	.....	.....	.....	.....
Total for diseases	125,563	1,820.94	1,457	21.13	801	11.62	115,787	1,821.09	1,363	21.44	747	11.75	9,776	1,819.13	94	17.49	54	10.05
Drowning	7	.10	.....	.....	77	1.12	7	.11	.....	.....	69	1.09	.....	.....	.....	.....	8	1.49
Exhaustion from exposure and fatigue	350	5.08	2	.03	2	.03	323	5.08	2	.03	2	.03	27	5.02	.....	.....	.....	.....
Heat stroke	129	1.87	7	.10	5	.07	124	1.95	6	.09	4	.06	5	.93	1	.19	1	.19
Lightning stroke	3	.04	.....	.....	.....	.....	2	.03	.....	.....	.....	.....	1	.19	.....	.....	.....	.....
Venomous bites, stings, and wounds	597	8.66	2	.03	1	.01	567	8.92	2	.03	.....	.....	30	5.58	.....	.....	.....	.....
Abrasions, blisters, burns, and scalds	1,525	22.12	.....	.....	1	.01	1,419	22.32	.....	.....	1	.02	106	19.72	.....	.....	.....	.....
Compression and concussion of brain	30	.44	3	.04	3	.04	29	.46	3	.05	2	.03	1	.19	.....	.....	1	.19
Contusions and sprains	6,132	88.93	3	.04	.....	.....	5,434	85.46	3	.05	.....	.....	698	129.88	.....	.....	.....	.....
Dislocations	216	3.13	9	.13	.....	.....	197	3.10	8	.13	.....	.....	19	3.54	1	.19	.....	.....
Fractures (not shot)	550	7.98	39	.57	7	.10	523	8.23	37	.58	7	.11	27	5.02	2	.37	.....	.....
Hernia	346	5.02	78	1.13	.....	.....	318	5.00	73	1.15	.....	.....	28	5.21	5	.93	.....	.....
Wounds, contused, lacerated, and punctured	1,854	26.89	6	.09	4	.06	1,618	25.45	6	.09	3	.05	236	43.92	.....	.....	1	.19
Wounds, incised	855	12.40	3	.04	13	.19	749	11.78	3	.05	12	.19	106	19.72	.....	.....	1	.19
Wounds, gunshot	564	8.18	185	2.68	216	3.13	500	7.86	172	2.71	192	3.02	64	11.91	13	2.42	24	4.47
Secondary results of injury	369	5.35	58	.84	2	.03	336	5.28	55	.87	1	.02	33	6.14	3	.56	1	.19
Other injuries	888	12.88	9	.13	13	.19	763	12.00	8	.13	13	.20	125	23.26	1	.19	.....	.....
Total for injuries	14,415	209.05	404	5.86	344	4.99	12,909	203.03	378	5.94	306	4.81	1,506	280.24	26	4.84	38	7.07
Total for diseases and injuries	139,978	2,029.99	1,861	26.99	1,145	16.61	128,696	2,024.13	1,741	27.38	1,053	16.56	11,282	2,099.37	120	22.33	92	17.12

TABLE III.—*Armies, Regular and Volunteer, 1900—Admissions to sick report, discharges, and deaths from various causes, etc.*—Continued.

Year 1900.	Volunteer Army.						White troops, Volunteers.						Colored troops, Volunteers.					
Mean strength	31,434						28,793						2,641					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	1	0.03					1	0.03										
Measles	257	8.18			5	0.16	239	8.30			5	0.17	18	6.82				
Smallpox	166	5.28			90	2.86	101	3.51			58	2.01	65	24.61			32	12.12
Vaccinia	328	10.43					312	10.84					16	6.06				
Influenza	261	8.30					260	9.03					1	.38				
Dengue	1,821	57.93					1,781	61.86					40	15.15				
Mumps	301	9.58					280	9.72					21	7.95				
Diphtheria	11	.35			2	.06	11	.38			2	.07						
Typhoid fever	443	14.09	1	0.03	104	3.31	437	15.18	1	0.03	102	3.54	6	2.27			2	.75
Cerebro spinal fever	6	.19			5	.16	6	.21			5	.17						
Malarial fever, intermittent	28,144	895.34					27,310	948.49					834	315.79				
Malarial fever, remittent	4,915	156.37			11	.35	4,858	168.72			9	.31	57	21.58			2	.76
Malarial fever, pernicious	111	3.53			42	1.34	106	3.68			38	1.32	5	1.89			4	1.51
Malarial cachexia	1,682	53.51	9	.29	9	.29	1,674	58.14	9	.31	9	.31	8	3.03				
Fever, undetermined	869	27.65					834	28.97					35	13.25				
Erysipelas	20	.64			1	.03	20	.69			1	.03						
Septicæmia and tetanus	11	.35			7	.22	8	.28			6	.21	3	1.14			1	.38
Rheumatic fever	153	4.87					140	4.86					13	4.92				
Consumption	160	5.09	21	.67	44	1.40	143	4.97	20	.69	37	1.28	17	6.44	1	0.38	7	2.65
Cancer	4	.13					4	.14										
Syphilis and results	316	10.05	11	.35	2	.06	290	10.07	10	.35	2	.07	26	9.84	1	.38		
Gonorrhœa and results	1,439	45.78	1	.03			1,314	45.64	1	.03			125	47.33				
Chancroid and results	758	24.11	1	.03	1	.03	627	21.78	1	.03			131	49.60			1	.38
Infections, other	39	1.24	1	.03	1	.03	32	1.11	1	.03			7	2.65			1	.38
Total infectious diseases	42,216	1,343.00	45	1.43	324	10.31	40,788	1,416.59	43	1.49	274	9.52	1,428	540.70	2	.76	50	18.93
Anemia	241	7.67			3	.10	239	8.30			3	.10	2	.76				
Nutrition, others	19	.60	3	.10	1	.03	19	.66	3	.10	1	.03						
Total diseases of nutrition	260	8.27	3	.10	4	.13	258	8.96	3	.10	4	.14	2	.76				
Alcoholism	273	8.68	1	.03	6	.19	271	9.41	1	.03	5	.17	2	.76			1	.38
Brain and spinal cord	126	4.01	18	.57	4	.13	111	3.86	18	.63	3	.10	15	5.68			1	.38
Insanity	123	3.91	39	1.24	1	.03	112	3.89	37	1.28	1	.03	11	4.17	2	.76		

TABLE III.—*Armies, Regular and Volunteer, 1900—Admissions to sick report, discharges, and deaths from various causes, etc.*—Continued.

Year 1900.	Volunteer Army.						White troops, Volunteers.						Colored troops, Volunteers.					
Mean strength	31,434						28,793						2,641					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Meningitis	12	0.38	1	0.03	3	0.10	12	0.42	1	0.03	3	0.10						
Poisoning, narcotic	14	.45			3	.10	14	.49			3	.10						
Nervous system, others	689	21.92	14	.45	1	.03	580	20.14	13	.45	1	.03	109	41.27	1	0.38		
Total diseases of the nervous system	1,237	39.35	73	2.32	18	.57	1,100	38.20	70	2.43	16	.56	137	51.87	3	1.14	2	0.76
Poisoning, irritant	17	.54					13	.45					4	1.51				
Tonsillitis, pharyngitis, and sore throat	698	22.21					646	22.44					52	19.69				
Peritonitis	11	.35			8	.25	11	.38			8	.28						
Dyspepsia, colic, and constipation	2,813	89.49	2	.06			2,589	89.92	2	.07			224	84.82				
Gastritis	1,546	49.18	5	.16	2	.06	1,517	52.68	5	.17	2	.07	29	10.98				
Dysentery, acute	2,941	93.56			136	4.33	2,805	97.42			131	4.55	136	51.50			5	1.89
Dysentery, chronic	1,621	51.57	25	.80	154	4.90	1,611	55.95	25	.87	154	5.35	10	3.79				
Diarrheal diseases, others	18,575	590.92	16	.51	52	1.65	18,065	627.41	16	.56	52	1.81	510	193.11				
Enteritis	432	13.74	9	.29	9	.29	414	14.38	9	.31	9	.31	18	6.82				
Perityphlitis and appendicitis	80	2.55	1	.03	9	.29	73	2.54			6	.21	7	2.65	1	.38	3	1.14
Digestive system, others	1,615	51.38	7	.22	11	.35	1,543	53.59	7	.24	10	.35	72	27.26			1	.38
Total diseases of the digestive system	30,349	965.48	65	2.07	381	12.12	29,287	1,017.16	64	2.22	372	12.92	1,062	402.12	1	.38	9	3.41
Heart, diseases of	144	4.58	10	.32	6	.19	143	4.97	10	.35	6	.21	1	.38				
Arteries and veins	72	2.29	5	.16	1	.03	70	2.43	5	.17	1	.03	2	.76				
Total diseases of the circulatory system	216	6.87	15	.48	7	.22	213	7.40	15	.52	7	.24	3	1.14				
Bronchitis	1,402	44.60	3	.10			1,332	46.26	3	.10			70	26.50				
Pneumonia	82	2.61	1	.03	24	.76	70	2.43	1	.03	23	.80	12	4.54			1	.38
Pleurisy	120	3.82	5	.16	3	.10	105	3.65	5	.17	2	.07	15	5.68			1	.38
Respiratory system, others	555	17.66	5	.16	5	.16	526	18.27	4	.14	3	.10	29	10.98	1	.38	2	.76
Total diseases of the respiratory system	2,159	68.68	14	.45	32	1.02	2,033	70.61	13	.45	28	.97	126	47.71	1	.38	4	1.51
Kidneys, diseases of	122	3.88	5	.16	17	.54	110	3.82	5	.17	16	.56	12	4.54			1	.38

Varicocele	111	3.53					107	3.72					4	1.51				
Genito-urinary, others	376	11.96	1	.03	1	.03	346	12.02	1	.03	1	.03	30	11.36				
Total diseases of the genito-urinary system	609	19.37	6	.19	18	.57	563	19.55	6	.21	17	.59	46	17.42			1	.38
Adenitis	200	6.36					185	6.42					15	5.68				
Lymphatic system, others	34	1.08	2	.06			31	1.08	1	.03			3	1.14	1	.38		
Total diseases of the lymphatic system	234	7.44	2	.06			216	7.50	1	.03			18	6.82	1	.38		
Rheumatism, muscular	1,120	35.63	4	.13			1,041	36.15	4	.14			79	29.91				
Osteitis and periostitis	65	2.07	1	.03			59	2.05	1	.03			6	2.27				
Arthritis and synovitis	248	7.89	5	.16			223	7.74	5	.17			25	9.47				
Rheumatism, chronic articular	186	5.92	19	.60			162	5.63	17	.59			24	9.09	2	.76		
Muscles, bones, and joints, others	75	2.39	12	.38			72	2.50	11	.38			3	1.14	1	.38		
Total diseases of the muscles, bones, and joints	1,694	53.89	41	1.30			1,557	54.08	38	1.32			137	51.87	3	1.14		
Total diseases of the integumentary system	6,374	202.78					6,111	212.24					263	99.59				
Total diseases of the eye	146	14.19	20	.64			128	14.86	18	.63			18	6.82	2	.76		
Total diseases of the ear	585	18.61	35	1.11			569	19.76	34	1.18			16	6.06	1	.38		
Total diseases of the nose	23	.73	2	.06			21	.73	2	.07			2	.76				
Total unclassified and undiagnosed	412	13.11					409	14.20					3	1.14				
Total for diseases	86,814	2,761.79	321	10.21	784	24.94	83,563	2,901.85	307	10.66	748	24.94	3,261	1,234.76	14	5.30	66	24.99
Drowning					39	1.24					29	1.01					10	3.79
Exhaustion from exposure and fatigue	100	12.73					391	13.58					9	3.41				
Heat stroke	66	2.10	1	.03	4	.13	64	2.22	1	.03	3	.10	2	.76			1	.38
Lightning stroke	1	.03					1	.03										
Venomous bites, stings, and wounds	258	8.21	1	.03			254	8.82	1	.03			4	1.51				
Abrasions, blisters, burns, and scalds	930	31.50					952	33.06					38	14.39				
Compression and concussion of brain	8	.25			1	.03	8	.28			1	.03						
Contusions and sprains	1,140	45.81	1	.03			1,366	47.44	1	.03			74	28.02				
Dislocations	51	1.62					49	1.70					2	.76				
Fractures (not shot)	160	5.09	5	.16	4	.13	155	5.38	5	.17	4	.14	5	1.89				
Hernia	246	7.83	24	.76			239	8.30	23	.80			7	2.65	1	.38		
Wounds, contused, lacerated, and punctured	498	15.84			1	.03	464	16.12			1	.03	34	12.87				
Wounds, incised	402	12.79	3	.10	45	1.43	383	13.30	3	.10	44	1.53	19	7.19			1	.38
Wounds, gunshot	609	19.37	50	1.59	255	8.11	589	20.46	49	1.70	247	8.58	20	7.57	1	.38	8	3.03
Secondary results of injury	71	2.26					69	2.40					2	.76				
Other injuries	88	2.80	2	.06	5	.16	86	2.99	2	.07	5	.17	2	.76				
Total for injuries	5,288	168.25	87	2.77	354	11.26	5,070	176.08	85	2.95	334	11.60	318	82.54	2	.76	20	7.57
Total for diseases and injuries	92,102	2,930.01	408	12.98	1,138	36.20	88,633	3,077.94	392	13.61	1,082	36.54	3,579	1,317.30	16	6.06	86	32.56

TABLE III.—*Armies, Regular and Volunteer, 1900—Admissions to sick report, discharges, and deaths from various causes, etc.*—Continued.

Decade, 1889–1898.	United States Army.						White troops.					
Mean strength	29,308						26,648					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	52	0.20	.....	.....	3	0.01	52	0.20	.....	.....	3	0.01
Measles	2,480	8.46	.....	.....	12	.04	2,390	8.97	.....	.....	12	.05
Smallpox	39	.13	.....	.....	9	.03	35	.13	.....	.....	9	.03
Vaccinia	10,832	36.96	1	0.003	.....	.....	9,985	37.47	1	0.004	.....	.....
Influenza	17,535	59.83	1	.003	47	.16	15,542	58.33	1	.004	43	.16
Dengue	1,004	3.43	.....	.....	.....	.....	1,001	3.76	.....	.....	.....	.....
Mumps	1,480	5.05	.....	.....	.....	.....	1,238	4.65	.....	.....	.....	.....
Diphtheria	159	.54	.....	.....	5	.02	139	.52	.....	.....	5	.02
Typhoid fever	5,387	18.38	21	.07	588	2.01	5,228	19.62	21	.08	558	2.09
Yellow fever	611	2.08	.....	.....	73	.25	414	1.55	.....	.....	48	.18
Cerebro spinal fever	44	.15	7	.02	19	.06	42	.16	7	.03	19	.07
Malarial fever, intermittent	36,555	124.73	.....	.....	9	.03	34,065	127.84	.....	.....	9	.03
Malarial fever, remittent	11,577	39.50	3	.01	75	.26	10,860	40.76	3	.01	66	.25
Malarial fever, pernicious	287	.98	.....	.....	82	.28	268	1.01	.....	.....	71	.27
Malarial cachexia	2,660	9.08	25	.09	4	.01	2,350	8.82	25	.09	4	.02
Fever, undetermined	4,154	14.17	.....	.....	.....	.....	3,817	14.32	.....	.....	.....	.....
Erysipelas	414	1.41	.....	.....	13	.04	383	1.44	.....	.....	9	.03
Septicæmia and tetanus	15	.05	.....	.....	12	.04	14	.05	.....	.....	11	.04
Rheumatic fever	1,451	4.95	16	.05	3	.01	1,311	4.92	13	.05	2	.01
Consumption	779	2.66	410	1.40	140	.48	646	2.42	345	1.29	103	.39
Cancer	58	.20	8	.03	31	.11	53	.20	7	.03	29	.11
Syphilis and results	3,762	12.84	304	1.04	9	.03	3,323	12.47	249	.93	8	.03
Gonorrhœa and results	13,493	46.03	51	.17	.....	.....	12,302	46.16	49	.18	.....	.....
Chancroid and results	3,686	12.58	2	.01	.....	.....	3,235	12.14	2	.01	.....	.....
Infections, other	585	2.00	20	.07	20	.07	534	2.00	17	.06	18	.07
Total infectious diseases	119,099	406.37	869	2.97	1,154	3.94	109,227	409.89	740	2.78	1,027	3.85
Anemia	323	1.10	15	.05	5	.02	313	1.17	13	.05	5	.02
Nutrition, others	289	.99	96	.33	10	.03	263	.99	87	.33	9	.03
Total diseases of nutrition	612	2.09	111	.38	15	.05	576	2.16	100	.37	14	.05
Alcoholism	8,403	28.67	9	.03	60	.20	8,274	31.05	8	.03	60	.23
Brain and spinal cord	1,642	5.60	188	.64	77	.26	1,514	5.68	175	.66	71	.27

Insanity	331	1.13	287	.98	8	.03	311	1.17	273	1.02	7	.03
Meningitis	18	.06	1	.003	10	.03	17	.06	1	.004	9	.03
Poisoning, narcotic	140	.48	10	.03	18	.06	134	.50	9	.03	18	.07
Nervous system, others	9,417	32.13	152	.52	10	.03	8,315	31.20	144	.54	9	.03
Total diseases of the nervous system	19,951	68.07	647	2.21	183	.62	18,565	69.67	610	2.29	174	.65
Poisoning, irritant	243	.83	.....	.....	48	.16	233	.87	.....	.....	46	.17
Tonsillitis, pharyngitis, and sore throat	18,423	62.86	1	.003	1	.003	16,208	60.83	1	.004	1	.004
Peritonitis	61	.21	5	.02	17	.06	59	.22	5	.02	17	.06
Dyspepsia, colic, and constipation	16,826	57.41	39	.13	2	.01	14,929	56.02	35	.13	2	.01
Gastritis	1,377	4.70	23	.08	13	.04	1,308	4.91	21	.08	12	.05
Diarrheal diseases, others	36,029	122.93	37	.13	111	.38	33,780	126.77	35	.13	106	.40
Enteritis	996	3.40	5	.02	26	.09	957	3.59	5	.02	25	.09
Perityphlitis and appendicitis	239	.82	6	.02	21	.07	220	.83	6	.02	19	.07
Digestive system, others	8,536	29.12	59	.20	58	.20	7,622	28.61	53	.20	54	.20
Total diseases of the digestive system	82,730	282.28	175	.60	297	1.01	75,316	282.64	161	.60	282	1.06
Heart, diseases of	1,321	4.51	309	1.05	100	.34	1,220	4.58	284	1.07	92	.35
Arteries and veins	340	1.16	71	.24	28	.10	326	1.22	71	.27	20	.08
Total diseases of the circulatory system	1,661	5.67	380	1.30	128	.44	1,546	5.80	355	1.33	112	.42
Bronchitis	19,753	67.40	37	.13	4	.01	17,784	66.74	35	.13	4	.02
Pneumonia	1,051	3.59	8	.03	172	.59	899	3.37	7	.03	152	.57
Pleurisy	629	2.15	19	.06	7	.02	560	2.10	16	.06	6	.02
Respiratory system, others	8,522	29.08	47	.16	19	.06	7,804	29.29	45	.17	14	.05
Total diseases of the respiratory system	29,955	102.21	111	.38	202	.69	27,047	101.50	103	.39	176	.66
Kidneys, diseases of	485	1.65	52	.18	69	.24	433	1.62	47	.18	62	.23
Varicocele	327	1.12	38	.13	.....	.....	309	1.16	37	.14	.....	.....
Genito-urinary, others	1,962	6.69	72	.25	3	.01	1,696	6.36	63	.24	3	.01
Total diseases of the genito-urinary system	2,774	9.47	162	.56	72	.25	2,438	9.15	147	.55	65	.24
Adenitis	984	3.36	8	.03	.....	.....	859	3.22	8	.03	.....	.....
Lymphatic system, others	165	.56	5	.02	2	.01	148	.56	5	.02	2	.01
Total diseases of the lymphatic system	1,149	3.92	13	.04	2	.01	1,007	3.78	13	.05	2	.01
Rheumatism, muscular	14,180	48.38	138	.47	.....	.....	12,289	46.12	124	.47	.....	.....
Osteitis and periostitis	224	.76	27	.09	.....	.....	200	.75	20	.08	.....	.....
Arthritis and synovitis	1,048	3.55	110	.38	.....	.....	913	3.43	101	.38	.....	.....
Rheumatism, chronic articular	3,635	12.40	189	.64	1	.003	3,095	11.61	167	.63	1	.004
Muscles, bones, and joints, others	845	2.88	74	.25	2	.01	777	2.92	67	.25	1	.004
Total diseases of the muscles, bones, and joints	19,932	68.01	538	1.84	3	.01	17,274	64.81	479	1.80	2	.01

TABLE III.—*Armies, Regular and Volunteer, 1900—Admissions to sick report, discharges, and deaths from various causes, etc.*—Continued.

Decade, 1889–1898.	United States Army.						White troops.					
Mean strength	29,308						26,648					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Total diseases of the integumentary system	20,573	70.19	38	0.13	4	0.01	19,392	72.78	33	0.12	2	0.01
Total diseases of the eye	4,415	15.06	211	.72	.....	.....	3,699	13.88	192	.72	.....	.....
Total diseases of the ear	1,911	6.52	134	.46	4	.01	1,813	6.80	130	.49	3	.01
Total diseases of the nose	459	1.57	28	.10	1	.003	428	1.61	26	.10	1	.004
Total unclassified and undiagnosed	1,761	6.01	8	.03	11	.04	1,612	6.05	8	.03	8	.03
Total for diseases	306,982	1,047.44	3,425	11.68	2,076	7.08	279,940	1,050.52	3,097	11.62	1,868	7.01
Drowning	.....	.....	.....	.....	150	.51	.....	.....	.....	.....	139	.52
Exhaustion from exposure and fatigue	606	2.07	1	.003	11	.04	582	2.18	1	.004	11	.04
Heat stroke	706	2.41	10	.03	13	.04	677	2.54	9	.03	12	.05
Lightning stroke	12	.04	.....	.....	4	.01	11	.04	.....	.....	4	.02
Venomous bites, stings, and wounds	572	1.95	2	.01	.....	.....	525	1.97	2	.01	.....	.....
Abrasions, blisters, burns, and scalds	5,400	18.42	4	.01	.....	.....	5,066	19.01	4	.02	.....	.....
Compression and concussion of brain	180	.61	6	.02	20	.07	161	.60	6	.02	18	.07
Contusions and sprains	34,106	116.37	62	.21	5	.02	30,822	115.67	54	.20	4	.02
Dislocations	713	2.43	22	.08	1	.003	656	2.46	18	.07	1	.004
Fractures (not shot)	1,909	6.51	125	.43	42	.14	1,753	6.58	117	.44	34	.13
Hernia	830	2.83	269	.92	1	.003	763	2.86	247	.93	1	.004
Wounds, contused, lacerated, and punctured	8,738	29.81	38	.13	6	.02	7,634	28.65	34	.13	6	.02
Wounds, incised	4,476	1.53	20	.07	8	.03	4,008	15.04	20	.08	5	.02
Wounds, gunshot	2,158	7.37	231	.79	427	1.46	1,778	6.67	215	.81	363	1.36
Secondary results of injury	601	2.05	62	.21	.....	.....	521	1.96	56	.21	.....	.....
Other injuries	7,208	24.59	57	.19	116	.40	6,292	23.62	48	.18	114	.43
Total for injuries	68,215	232.75	909	3.10	804	2.74	61,249	229.85	831	3.12	712	2.67
Total for diseases and injuries	375,197	1,280.19	4,334	14.79	2,880	9.83	341,189	1,280.37	3,928	14.74	2,580	9.68

TABLE III.—*Armies, Regular and Volunteer, 1900—Admissions to sick report, discharges, and deaths from various causes, etc.*—Continued.

Decade 1889-1898.	Colored troops.						Indian troops.					
Mean strength	2,433						227					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever												
Measles	82	3.37					8	3.52				
Smallpox	4	.16										
Vaccinia	621	25.52					226	99.56				
Influenza	1,914	78.66			1	0.16	79	34.81				
Dengue	3	.12										
Mumps	200	8.22					42	18.50				
Diphtheria	20	.82										
Typhoid fever	158	6.49			30	1.23	1	.44				
Yellow fever	197	8.10			25	1.03						
Cerebro-spinal fever	2	.08										
Malarial fever, intermittent	2,424	99.62					66	29.08				
Malarial fever, remittent	713	29.30			9	.37	4	1.76				
Malarial fever, pernicious	19	.78			11	.45						
Malarial cachexia	310	12.74										
Fever, undetermined	324	13.31					13	5.73				
Erysipelas	18	.74			1	.16	13	5.73				
Septicæmia and tetanus	1	.04			1	.04						
Rheumatic fever	131	5.38	2	0.08	1	.04	9	3.96	1	0.44		
Consumption	79	3.25	39	1.60	21	.86	54	23.79	26	11.41	16	7.04
Cancer	5	.21	1	.04	2	.08						
Syphilis and results	406	16.69	49	2.01	1	.04	33	14.54	6	2.64		
Gonorrhœa and results	1,042	42.83	2	.08			149	65.64				
Chancroid and results	425	17.47					26	11.45				
Infections, other	30	1.23	1	.04	2	.08	21	9.25	2	.88		
Total infectious diseases	9,128	375.15	94	3.86	111	4.56	744	327.75	35	15.37	16	7.04
Anæmia	10	.41	2	.08								
Nutrition, others	25	1.03	9	.37	1	.04	1	.44				
Total diseases of nutrition	35	1.44	11	.45	1	.04	1	.44				

TABLE III—*Armies, Regular and Volunteer, 1900—Admissions to sick report, discharges, and deaths from various causes, etc.*—Continued.

Decade 1889–1898.	Colored troops.						Indian troops.					
Mean strength	2,433						227					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Alcoholism	198	4.19	1	0.04			10	4.41				
Brain and spinal cord	125	5.14	12	.49	5	0.21	3	1.32	1	0.44	1	0.44
Insanity	20	.82	14	.58	1	.04						
Meningitis	1	.04			1	.04						
Poisoning, narcotic	5	.21	1	.04			1	.44				
Nervous system, others	1,031	42.37	6	.25	1	.04	71	31.28	2	.88		
Total diseases of the nervous system	1,301	53.47	34	1.40	8	.33	85	37.45	3	1.32	1	.44
Poisoning, irritant	10	.41			2	.08						
Tonsillitis, pharyngitis, and sore throat	2,094	86.02					121	53.30				
Peritonitis	2	.08										
Dyspepsia, colic, and constipation	1,765	72.54	4	.16			132	58.15				
Gastritis	66	2.71	2	.08	1	.04	3	1.32				
Diarrheal diseases, others	2,152	88.44	2	.08	5	.21	97	42.74				
Enteritis	38	1.56			1	.04	1	.44				
Perityphlitis and appendicitis	19	.78			2	.08						
Digestive system, others	881	36.21	6	.25	4	.16	33	14.54				
Total diseases of the digestive system	7,027	288.80	14	.58	15	.62	387	170.50				
Heart, diseases of	96	3.95	23	.95	7	.29	5	2.20	2	.88	1	.44
Arteries and veins	14	.58			8	.33						
Total diseases of the circulatory system	110	4.52	23	.95	15	.62	5	2.20	2	.88	1	.44
Bronchitis	1,848	75.95	2	.08			121	53.30				
Pneumonia	130	5.34	1	.04	18	.74	22	9.69			2	.88
Pleurisy	64	2.63	1	.04	1	.04	5	2.20	2	.88		
Respiratory system, others	670	27.54	1	.04	5	.21	48	21.15	1	.44		
Total diseases of the respiratory system	2,712	111.46	5	.21	24	.99	196	86.34	3	1.32	2	.88

Kidneys, diseases of	52	2.14	5	.21	7	.29						
Varicocele	18	.74	1	.04								
Genito-urinary, others	250	10.27	8	.33			16	7.05	1	.44		
Total diseases of the genito-urinary system	320	13.15	14	.58	7	.29	16	7.05	1	.44		
Adenitis	104	4.27					21	9.25				
Lymphatic system, others	14	.58					3	1.32				
Total diseases of the lymphatic system	118	4.85					24	10.57				
Rheumatism, muscular	1,810	74.39	14	.58			81	35.69				
Osteitis and periostitis	23	.95	6	.25			1	.44	1	.44		
Arthritis and synovitis	132	5.43	9	.37			3	1.32				
Rheumatism, chronic articular	522	21.45	20	.82			18	7.93	2	.88		
Muscles, bones, and joints, others	63	2.59	6	.25	1	.04	5	2.20	1	.44		
Total diseases of the muscles, bones, and joints	2,550	104.80	55	2.26	1	.04	108	47.57	4	1.76		
Total diseases of the integumentary system	1,026	42.16	5	.21	2	.08	155	68.29				
Total diseases of the eye	584	24.00	18	.74			132	58.15	1	.44		
Total diseases of the ear	80	3.29	4	.16			18	7.93			1	.44
Total diseases of the nose	27	1.11	2	.08			4	1.76				
Total unclassified and undiagnosed	135	5.55			2	.08	14	6.17			1	.44
Total for diseases	25,153	1,033.74	279	11.47	186	7.65	1,889	832.16	49	21.57	22	9.68
Drowning					10	.41					1	.44
Exhaustion from exposure and fatigue	24	.99										
Heat stroke	29	1.19	1	.04	1	.04						
Lightning stroke	1	.04										
Venomous bites, stings, and wounds	44	1.81					3	1.32				
Abrasions, blisters, burns, and scalds	274	11.26					60	26.43				
Compression and concussion of brain	19	.78			2	.08						
Contusions and sprains	3,010	123.71	8	.33	1	.04	274	120.71				
Dislocations	44	1.81	4	.16			13	5.73				
Fractures (not shot)	131	5.38	8	.33	4	.16	25	11.01			4	1.76
Hernia	64	2.63	19	.78			3	1.32	3	1.32		
Wounds, contused, lacerated, and punctured	964	39.62	4	.16			140	61.67				
Wounds, incised	414	17.01			3	.12	54	23.79				
Wounds, gunshot	365	15.00	14	.58	53	2.18	15	6.61	2	.88	11	4.84
Secondary results of injury	76	3.12	5	.21			4	1.76	1	.44		
Other injuries	864	35.51	9	.37	2	.08	52	22.91				
Total for injuries	6,323	259.86	72	2.96	76	3.12	643	283.28	6	2.64	16	7.04
Total for diseases and injuries	31,476	1,293.60	351	14.43	262	10.77	2,532	1,115.42	55	24.21	38	16.72

TABLE IV.—*Armies, Regular and Volunteer, 1900—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by the countries in which service was rendered.*

[All the Volunteer troops in service during the year were on duty in the Division of the Philippines.]

Year 1900.	Pacific islands, Volunteers.						Pacific islands, Regulars.						Pacific islands, total.					
Mean strength	31,434						35,448						66,882					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	1	0.03					1	0.03					2	0.03				
Measles	257	8.18			5	0.16	57	1.61			1	0.03	314	4.69			6	0.09
Smallpox	166	5.28			90	2.86	80	2.26			23	.65	246	3.68			113	1.69
Vaccinia	328	10.43					290	8.18					618	9.24				
Influenza	261	8.30					168	4.74					429	6.41				
Dengue	1,821	57.93					1,458	41.13					3,279	49.03				
Mumps	301	9.58					109	3.08					410	6.13				
Diphtheria	11	.35			2	.06	14	.39			2	.06	25	.37			4	.06
Typhoid fever	443	14.09	1	0.03	104	3.31	273	7.70			37	1.04	716	10.71	1	0.01	141	2.11
Cerebro spinal fever	6	.19			5	.16	3	.08			3	.08	9	.13			8	.12
Malarial fever, intermittent	28,144	895.34					19,866	560.43	2	0.06			48,010	717.83	2	.03		
Malarial fever, remittent	4,915	156.37			11	.35	5,355	151.07			13	.37	10,270	153.56			24	.36
Malarial fever, pernicious	111	3.53			42	1.34	79	2.23			40	1.13	190	2.84			82	1.23
Malarial cachexia	1,682	53.51	9	.29	9	.29	1,031	29.09	20	.56	5	.14	2,713	40.56	29	.43	14	.21
Fever, undetermined	869	27.65					1,071	30.22			1	.03	1,940	29.01			1	.01
Erysipelas	20	.64			1	.03	29	.82					49	.72			1	.01
Septicæmia and tetanus	11	.35			7	.22	13	.37			10	.28	24	.36			17	.25
Rheumatic fever	153	4.87					160	4.51	2	.06	1	.03	313	4.68	2	.03	1	.01
Consumption	160	5.09	21	.67	44	1.40	167	4.71	37	1.04	35	.99	327	4.89	58	.87	79	1.18
Cancer	4	.13					3	.08					7	.10				
Syphilis and results	316	10.05	11	.35	2	.06	523	14.75	26	.73	2	.06	839	12.54	37	.55	4	.06
Gonorrhea and results	1,439	45.78	1	.03			2,753	77.67	8	.23			4,192	62.68	9	.13		
Chancroid and results	758	24.11	1	.03	1	.03	1,647	46.46					2,405	35.96	1	.01	1	.01
Infections, other	39	1.24	1	.03	1	.03	63	1.78	4	.11	3	.08	102	1.53	5	.07	4	.06
Total infectious diseases	42,216	1,343.00	45	1.43	324	10.31	35,213	993.37	99	2.79	176	4.97	77,429	1,157.69	144	2.15	500	7.48
Anemia	241	7.67			3	.10	203	5.73	3	.08	2	.06	444	6.64	3	.04	5	.07
Nutrition, others	19	.60	3	.10	1	.03	62	1.75	1	.03			81	1.21	4	.06	1	.01
Total diseases of nutrition	260	8.27	3	.10	4	.13	265	7.48	4	.11	2	.06	525	7.85	7	.10	6	.09

Alcoholism	273	8.68	1	.03	6	.19	440	12.41	4	.11	7	.20	713	10.66	5	.07	13	.19
Brain and spinal cord	126	4.01	18	.57	4	.13	162	4.57	37	1.04	7	.20	288	4.31	55	.82	11	.16
Insanity	123	3.91	39	1.24	1	.03	99	2.79	66	1.86	2	.06	222	3.32	105	1.57	3	.04
Meningitis	12	.38	1	.03	3	.10	10	.28			1	.03	22	.33	1	.01	4	.06
Poisoning, narcotic	14	.45			3	.10	34	.96	1	.03	2	.06	48	.72	1	.01	5	.07
Nervous system, others	689	21.92	14	.45	1	.03	963	27.17	26	.73	3	.08	1,652	24.70	40	.60	4	.06
Total diseases of the nervous system	1,237	39.35	73	2.32	18	.57	1,708	48.18	134	3.78	22	.62	2,945	44.03	207	3.10	40	.60
Poisoning, irritant	17	.54					122	3.44	1	.03	1	.03	139	2.08	1	.01	1	.01
Tonsillitis, pharyngitis, and sore throat	698	22.21					680	19.18					1,378	20.60				
Peritonitis	11	.35			8	.25	12	.34			3	.08	23	.34			11	.16
Dyspepsia, colic, and constipation	2,813	89.49	2	.06			3,019	85.17	3	.08			5,832	87.20	5	.07		
Gastritis	1,546	49.18	5	.16	2	.06	1,516	42.77	12	.34	1	.03	3,062	45.78	17	.25	3	.04
Dysentery, acute	2,941	93.56			136	4.33	2,652	74.82	5	.14	69	1.95	5,593	83.62	5	.07	205	3.07
Dysentery, chronic	1,621	51.57	25	.80	154	4.90	1,377	38.85	64	1.81	165	4.65	2,998	44.83	89	1.33	319	4.77
Diarrhœal diseases, others	18,575	590.92	16	.51	52	1.65	13,278	374.58	34	.96	31	.87	31,853	476.26	50	.75	83	1.24
Enteritis	432	13.74	9	.29	9	.29	950	26.80	5	.14	18	.51	1,382	20.66	14	.21	27	.40
Perityphlitis and appendicitis	80	2.55	1	.03	9	.29	86	2.43	6	.17	5	.14	166	2.48	7	.10	14	.21
Digestive system, others	1,615	51.38	7	.22	11	.35	1,663	46.92	26	.73	20	.56	3,278	49.02	33	.49	31	.46
Total diseases of the digestive system	30,349	965.48	65	2.07	381	12.12	25,355	715.27	156	1.40	313	8.83	55,704	832.87	221	3.30	694	10.38
Heart, diseases of	144	4.58	10	.32	6	.19	196	5.53	32	.90	23	.65	340	5.08	42	.63	29	.43
Arteries and veins	72	2.29	5	.16	1	.03	90	2.54	14	.39	2	.06	162	2.42	19	.28	3	.04
Total diseases of the circulatory system	216	6.87	15	.48	7	.22	286	8.07	46	1.30	25	.71	502	7.51	61	.91	32	.48
Bronchitis	1,402	44.60	3	.10			1,226	34.59	3	.08			2,628	39.29	6	.09		
Pneumonia	82	2.61	1	.03	24	.76	75	2.12	1	.03	9	.25	157	2.35	2	.03	33	.49
Pleurisy	120	3.82	5	.16	3	.10	155	4.37	9	.25	2	.06	275	4.11	14	.21	5	.07
Respiratory system, others	555	17.66	5	.16	5	.16	494	13.94	8	.23	1	.03	1,049	15.68	13	.19	6	.09
Total diseases of the respiratory system	2,159	68.69	14	.45	32	1.02	1,950	55.01	21	.59	12	.34	4,109	61.44	35	.52	44	.66
Kidneys, diseases of	122	3.88	5	.16	17	.54	131	3.70	10	.28	19	.54	253	3.78	15	.22	36	.54
Varicocele	111	3.53					155	4.37	2	.06			266	3.98	2	.03		
Genito-urinary, others	376	11.96	1	.03	1	.03	395	11.14	4	.11			771	11.53	5	.07	1	.01
Total diseases of the genito-urinary system	609	19.37	6	.19	18	.57	681	19.21	16	.45	19	.54	1,290	19.29	22	.33	37	.55
Adenitis	200	6.36					337	9.51	3	.08			537	8.03	3	.04		
Lymphatic system, others	34	1.08	2	.06			35	.99	1	.03			69	1.03	3	.04		
Total diseases of the lymphatic system	234	7.44	2	.06			372	10.50	4	.11			606	9.06	6	.09		
Rheumatism, muscular	1,120	35.63	4	.13			1,387	39.13	10	.28			2,507	37.49	14	.21		
Osteitis and periostitis	65	2.07	1	.03			59	1.66	2	.06			124	1.85	3	.04		
Arthritis and synovitis	248	7.89	5	.16			324	9.14	8	.23	1	.03	572	8.55	13	.19	1	.01

TABLE IV.—*Armies, Regular and Volunteer, 1900—Admissions to sick report, discharges, and deaths from various causes, etc.*—Continued.

Year 1900.	Pacific islands, Volunteers.						Pacific islands, Regulars.						Pacific islands, total.					
Mean strength	31,434						35,448						66,882					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Rheumatism, chronic articular	186	5.92	19	0.60	.....	.....	269	7.59	25	0.71	.....	.....	455	6.80	44	0.66	.....	.....
Muscles, bones, and joints, others	75	2.39	12	.38	.....	.....	194	5.47	14	.39	.....	.....	269	4.02	26	.39	.....	.....
Total diseases of the muscles, bones, and joints	1,694	53.89	41	1.30	.....	.....	2,233	63	59	1.66	1	.03	3,927	58.72	100	1.50	1	0.01
Total diseases of the integumentary system	6,374	202.78	.....	.....	.....	.....	8,237	232.36	.....	.....	1	.03	14,611	218.46	.....	.....	1	.01
Total diseases of the eye	446	14.19	20	.64	.....	.....	588	16.59	21	.59	.....	.....	1,034	15.46	41	.61	.....	.....
Total diseases of the ear	585	18.61	35	1.11	.....	.....	705	19.89	42	1.18	.....	.....	1,290	19.29	77	1.15	.....	.....
Total diseases of the nose	23	.73	2	.06	.....	.....	35	.99	2	.06	.....	.....	58	.87	4	.06	.....	.....
Total unclassified and undiagnosed	412	13.11	.....	.....	.....	.....	277	7.81	.....	.....	.....	.....	689	10.30	.....	.....	.....	.....
Total for diseases	86,814	2,761.79	321	10.21	784	24.94	77,905	2,197.73	604	17.04	571	16.11	164,719	2,462.83	925	13.83	13.55	20.26
Drowning	.....	.....	.....	.....	39	1.24	5	.14	.....	.....	37	1.04	5	.07	.....	.....	76	1.14
Exhaustion from exposure and fatigue	400	12.43	.....	.....	.....	.....	193	5.44	2	.06	1	.03	593	8.87	2	.03	1	.01
Heat stroke	66	2.10	1	.03	4	.13	71	2	5	.14	2	.06	137	2.05	6	.09	6	.09
Lightning stroke	1	.03	.....	.....	.....	.....	2	.06	.....	.....	.....	.....	3	.04	.....	.....	.....	.....
Venomous bites, stings, and wounds	258	8.21	1	.03	.....	.....	318	8.97	.....	.....	.....	.....	576	8.61	1	.01	.....	.....
Abrasions, blisters, burns, and scalds	990	31.50	.....	.....	.....	.....	760	21.44	.....	.....	1	.03	1,750	26.17	.....	.....	1	.01
Compression and concussion of brain	8	.25	.....	.....	1	.03	11	.31	2	.06	2	.06	19	.28	2	.03	3	.04
Contusions and sprains	1,440	45.81	1	.03	.....	.....	1,811	51.09	.....	.....	.....	.....	3,251	48.61	1	.01	.....	.....
Dislocations	51	1.62	.....	.....	.....	.....	89	2.51	4	.11	.....	.....	140	2.09	4	.06	.....	.....
Fractures (not shot)	160	5.09	5	.16	4	.13	180	5.08	8	.23	4	.11	340	5.08	13	.19	8	.12
Hernia	246	7.83	24	.76	.....	.....	195	5.50	31	.87	.....	.....	441	6.59	55	.82	.....	.....
Wounds, contused, lacerated, and punctured	498	15.84	.....	.....	1	.03	633	17.86	2	.06	2	.06	1,131	16.91	2	.03	3	.04
Wounds, incised	402	12.79	3	.10	45	1.43	371	10.47	3	.08	10	.28	773	11.56	6	.09	55	.82
Wounds, gunshot	609	19.37	50	1.59	255	8.11	284	8.01	119	3.36	150	4.23	893	13.35	169	2.53	405	6.06
Secondary results of injury	71	2.26	.....	.....	.....	.....	180	5.08	14	.39	.....	.....	251	3.75	14	.21	.....	.....
Other injuries	88	2.80	2	.06	5	.16	252	7.11	2	.06	5	.14	340	5.08	4	.06	10	.15
Total for injuries	5,288	168.23	87	2.77	354	11.26	5,355	151.06	192	5.42	214	6.04	10,643	159.13	279	4.17	568	8.49
Totals for diseases and injuries	92,102	2,930.01	408	12.98	1,138	36.20	83,260	2,348.79	796	22.46	785	22.15	175,362	2,621.96	1,204	18	1,923	28.75

TABLE IV—*Armies, Regular and Volunteer, 1900—Admissions to sick report, discharges, and deaths from various causes, etc.*—Continued.

Year 1900.	Cuba.						Porto Rico.						China.					
Mean strength	8,690						2,180						1,947					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever																		
Measles	9	1.04					7	3.21					3	1.54				
Smallpox																		
Vaccinia	67	7.71					2	.92					23	11.81				
Influenza	60	6.90					36	16.51					63	32.36				
Dengue							23	10.55					1	.51				
Mumps	22	2.53					3	1.38					6	3.08				
Diphtheria	1	.12											1	.51				
Typhoid fever	41	4.72			8	0.92	48	22.02			3	1.38	54	27.73			3	1.54
Yellow fever	144	16.57			32	3.68												
Cerebro-spinal fever	1	.12			1	.12							1	.51			1	.51
Malarial fever, intermittent	3,863	444.53					279	127.98					617	316.90				
Malarial fever, remittent	1,044	120.14					240	110.09					47	24.14				
Malarial fever, pernicious	22	2.53			9	1.04	2	.92			1	.46	2	1.03	1	0.51	1	.51
Malarial cachexia	123	14.15					18	8.26	1	0.46			18	24.65	3	1.54		
Fever, undetermined	29	3.34					2	.92					52	26.71				
Erysipelas	3	.35					2	.92										
Septicæmia and tetanus	1	.12			2	.23	1	.46			1	.46						
Rheumatic fever	18	2.07					8	3.67					11	5.65				
Consumption	33	3.80	13	1.50	1	.12	10	4.59	5	2.29			15	7.70	5	2.57	3	1.54
Cancer	2	.23					2	.92			1	.46						
Syphilis and results	230	26.47	22	2.53			96	44.03	2	.92			18	9.24				
Gonorrhœa and results	972	111.85	13	1.50			123	194.04	2	.92			193	99.13				
Chancroid and results	455	52.36					283	129.81					127	65.23				
Infections, other	4	.46					11	5.05					1	.51				
Total infectious diseases	7,144	822.09	48	5.52	53	6.10	1,496	686.24	10	4.59	6	2.75	1,285	658.96	9	4.62	8	4.11
Anæmia	21	2.42	1	.12			5	2.29					4	2.05				
Nutrition, others	8	.92	3	.35			3	1.38					1	.51				
Total diseases of nutrition	29	3.34	4	.46			8	3.67					5	2.57				
Alcoholism	256	29.46	1	.12	2	.23	92	42.20	1	.46			15	7.70				
Brain and spinal cord	23	2.65	5	.58			3	1.38					5	2.57	2	1.03	1	.51

TABLE IV.—*Armies, Regular and Volunteer, 1900—Admissions to sick report, discharges, and deaths from various causes, etc.*—Continued.

Year 1900.	Cuba.						Porto Rico.						China.					
Mean strength	8,690						2,180						1,947					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Insanity	14	1.61	10	1.15	.....	.....	3	1.38	4	1.83	.....	.....	7	3.60	.....	.....	.....	.....
Meningitis	.....	.....	.....	.....	.....	.....	1	.46	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Poisoning, narcotic	2	.23	1	.12	.....	.....	3	1.38	.....	.....	1	0.46	1	.51	.....	.....	.....	.....
Nervous system, others	231	26.58	4	.46	1	0.12	57	26.15	.....	.....	.....	.....	65	33.38	2	1.03	.....	.....
Total diseases of the nervous system	526	60.53	21	2.42	3	.35	159	72.94	5	2.29	1	.46	93	47.77	4	2.05	1	0.51
Poisoning, irritant	28	3.22	1	.12	.....	.....	54	24.77	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tonsillitis, pharyngitis, and sore throat	234	26.93	.....	.....	.....	.....	41	18.81	.....	.....	.....	.....	80	41.09	.....	.....	.....	.....
Peritonitis	2	.23	.....	.....	1	.12	.....	.....	.....	.....	.....	.....	1	.51	.....	.....	1	.51
Dyspepsia, colic, and constipation	603	69.39	1	.12	.....	.....	105	48.17	.....	.....	.....	.....	101	51.87	.....	.....	.....	.....
Gastritis	174	20.02	1	.12	1	.12	38	17.43	.....	.....	.....	.....	101	51.87	1	.51	.....	.....
Dysentery, acute	266	30.61	1	.12	5	.58	60	27.52	.....	.....	1	.46	342	175.64	1	.51	18	9.24
Dysentery, chronic	21	2.42	1	.12	.....	.....	3	1.38	.....	.....	1	.46	96	49.30	4	2.05	13	6.68
Diarrheal diseases, others	1,162	133.72	1	.12	.....	.....	260	119.27	5	2.29	.....	.....	2,028	1,041.60	1	.51	.....	.....
Enteritis	55	6.33	.....	.....	.....	.....	9	4.13	.....	.....	1	.46	54	27.73	2	1.03	1	.51
Perityphlitis and appendicitis	26	2.99	.....	.....	2	.23	3	1.38	1	.46	.....	.....	4	2.05	.....	.....	1	.51
Digestive system, others	305	35.10	.....	.....	2	.23	76	34.86	.....	.....	.....	.....	92	47.25	2	1.03	1	.51
Total diseases of the digestive system	2,876	330.96	6	.69	11	1.27	649	297.71	6	2.75	3	1.38	2,899	1,488.96	11	5.65	35	17.98
Heart, diseases of	49	5.64	7	.81	1	.12	6	2.75	.....	.....	.....	.....	7	3.60	1	.51	.....	.....
Arteries and veins	12	1.38	1	.12	1	.12	3	1.38	.....	.....	.....	.....	5	2.57	.....	.....	.....	.....
Total diseases of the circulatory system	61	7.02	8	.93	2	.23	9	4.13	.....	.....	.....	.....	12	6.16	1	.51	.....	.....
Bronchitis	255	29.34	1	.12	.....	.....	65	29.82	.....	.....	.....	.....	180	92.45	.....	.....	.....	.....
Pneumonia	14	1.61	.....	.....	.....	.....	5	2.29	.....	.....	.....	.....	6	3.08	.....	.....	.....	.....
Pleurisy	22	2.53	.....	.....	1	.12	6	2.75	.....	.....	.....	.....	14	7.19	1	.51	.....	.....
Respiratory system, others	186	21.40	.....	.....	1	.12	24	11.01	.....	.....	.....	.....	65	33.38	3	1.54	.....	.....
Total diseases of the respiratory system	477	54.89	1	.12	2	.23	100	45.87	.....	.....	.....	.....	265	136.11	4	2.05	.....	.....

Kidneys, diseases of	33	3.80	1	.12	2	.23	3	1.38					3	1.54			1	.51
Varicocele	54	6.21	2	.23			2	.92	1	.46			2	1.03	1	.51		
Genito-urinary, others	138	15.88	1	.12			18	8.26					12	6.16				
Total diseases of the genito-urinary system	225	25.89	4	.46	2	.23	23	10.55	1	.46			17	8.73	1	.51	1	.51
Adenitis	54	6.21					44	20.18					7	3.60				
Lymphatic system, others	9	1.04					5	2.29			1	.46	2	1.03				
Total diseases of the lymphatic system	63	7.25					49	22.48			1	.46	9	4.62				
Rheumatism, muscular	300	34.52					56	25.69	1	.46			81	41.60				
Osteitis and periostitis	20	2.30	2	.23			5	2.29	1	.46			6	3.08				
Arthritis and synovitis	85	9.78	2	.23			23	10.55					28	14.38				
Rheumatism, chronic articular	54	6.21	5	.58			5	2.29	2	.92			19	9.76	1	.51		
Muscles, bones, and joints, others	63	7.25	2	.23			10	4.59	1	.46			10	5.14				
Total diseases of the muscles, bones, and joints	522	60.07	11	1.27			99	45.41	5	2.29			144	73.96	1	.51		
Total diseases of the integumentary system	1,621	186.53	3	.35			413	189.45	1	.46			338	173.59				
Total diseases of the eye	136	15.65	5	.58			29	13.30	1	.46			21	10.79	3	1.54		
Total diseases of the ear	72	8.29	4	.46			10	4.59					15	7.70	1	.51		
Total diseases of the nose	11	1.27					2	.92	1	.46			3	1.54				
Total unclassified and undiagnosed	21	2.42					1	.46					8	4.11			1	.51
Total for diseases	15,784	1,586.19	115	13.23	73	8.40	3,047	1,397.71	30	13.76	11	5.05	5,112	2,625.58	35	17.98	46	23.62
Drowning	1	.12			1	.12											1	.51
Exhaustion from exposure and fatigue	14	1.61					3	1.38					97	49.82			1	.51
Heat-stroke	6	.69											38	19.52			3	1.54
Lightning stroke							1	.46										
Venomous bites, stings, and wounds	101	11.62			1	.12	20	9.17					51	26.19				
Abrasions, blisters, burns, and scalds	229	26.35					20	9.17					43	22.08				
Compression and concussion of brain	8	.92																
Contusions and sprains	1,249	143.72	1	.12			24	11.01					100	51.36				
Dislocations	35	4.03	1	.12			1	.46					3	1.54				
Fractures (not shot)	96	11.05	5	.58	2	.23	16	7.34					18	9.24	1	.51		
Hernia	46	5.29	12	1.38			3	1.38	1	.46			9	4.62				
Wounds, contused, lacerated, and punctured	366	42.12	1	.12			42	19.27					36	18.49				
Wounds, incised	149	17.15			1	.12	16	7.34					15	7.70				
Wounds, gunshot	29	3.34	5	.58	3	.35	12	5.50	1	.46			182	93.47	38	19.52	42	21.57
Secondary results of injury	37	4.26	3	.35	2	.23	20	9.17					12	6.16	1	.51		
Other injuries	127	14.61	1	.12	2	.23	28	12.84	1	.46			23	11.81				
Total for injuries	2,493	286.88	29	3.34	12	1.38	393	180.27	3	1.38			627	322.03	40	20.54	47	24.14
Total for diseases and injuries	16,277	1,873.07	144	16.57	85	9.78	3,440	1,577.98	33	15.14	11	5.05	5,739	2,947.61	75	38.52	93	47.76

TABLE IV.—*Armies, Regular and Volunteer, 1900—Admissions to sick report, discharges, and deaths from various causes, etc.*—Continued.

Year 1900.	Total islands and China.						United States (continental).					
Mean strength	79,699						20,690					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	2	0.03					4	0.19			1	0.05
Measles	333	4.18			6	0.08	235	11.36			1	.05
Smallpox	246	3.09			113	1.42	15	.72			1	.05
Vaccinia	710	8.91					1,326	64.09				
Influenza	588	7.38					1,044	50.46			1	.05
Dengue	3,303	41.44					18	.87				
Mumps	441	5.53					128	6.19				
Diphtheria	27	.34			4	.05	18	.87				
Typhoid fever	859	10.78	1	0.01	155	1.94	115	5.56	2	0.10	9	.43
Yellow fever	144	1.81			32	.40	4	.19				
Cerebro spinal fever	11	.14			10	.13						
Malarial fever, intermittent	52,769	662.10	2	.03			3,045	147.16				
Malarial fever, remittent	11,601	145.56			24	.30	230	11.12			1	.05
Malarial fever, pernicious	216	2.71	1	.01	93	1.17	4	.19			3	.14
Malarial cachexia	2,902	36.41	33	.41	14	.18	160	7.73	7	.34	1	.05
Fever, undetermined	2,023	25.38			1	.01	200	9.67			1	.05
Erysipelas	54	.68			1	.01	51	2.46				
Septicæmia and tetanus	26	.33			20	.25	6	.29	1	.05		
Rheumatic fever	350	4.39	2	.03	1	.01	83	4.01				
Consumption	385	4.83	81	1.02	83	1.04	109	5.27	56	2.71	13	.63
Cancer	11	.14			1	.01	5	.24	3	.14		
Syphilis and results	1,183	14.84	61	.77	4	.05	406	19.62	113	5.46	1	.05
Gonorrhœa and results	5,780	72.52	24	.30			2,119	102.42	34	1.64		
Chancroid and results	3,270	41.03	1	.01	1	.01	690	33.35	4	.19		
Infections, other	118	1.48	5	.06	4	.05	35	1.69	4	.19	2	.10
Total infectious diseases	87,352	1,096.02	211	2.65	567	7.11	10,050	485.74	224	10.83	35	1.69
Anemia	474	5.95	4	.05	5	.06	22	1.06			1	.05
Nutrition, others	93	1.17	7	.09	1	.01	21	1.01	49	2.37		
Total diseases of nutrition	567	7.11	11	.14	6	.08	43	2.08	49	2.37	1	.05
Alcoholism	1,076	13.50	7	.09	15	.19	464	22.43	6	.29	3	.14
Brain and spinal cord	319	4.00	62	.78	12	.15	76	3.67	37	1.79	5	.24

Insanity	246	3.09	119	1.49	3	.04	27	1.30	30	1.45	.....	.....
Meningitis	23	.29	1	.01	1	.05	3	.14	.....	.....	1	.05
Poisoning, narcotic	54	.68	2	.03	6	.08	20	.97	5	.24	3	.14
Nervous system, others	2,005	25.16	46	.58	5	.06	634	30.64	19	.92	.....	.....
Total diseases of the nervous system	3,723	46.73	237	2.97	45	.56	1,224	59.16	97	4.69	12	.58
Poisoning, irritant	221	2.77	2	.03	1	.01	64	3.09	.....	.....	2	.10
Tonsillitis, pharyngitis, and sore throat	1,733	21.74	.....	.....	.....	.....	1,787	86.37	.....	.....	.....	.....
Peritonitis	26	.33	.....	.....	13	.16	3	.14	.....	.....	2	.10
Dyspepsia, colic, and constipation	6,641	83.32	6	.08	.....	.....	2,059	99.51	1	.05	.....	.....
Gastritis	3,375	42.35	19	.24	4	.05	236	11.41	1	.05	.....	.....
Dysentery, acute	6,261	78.56	7	.09	229	2.87	78	3.77	.....	.....	.....	.....
Dysentery, chronic	3,118	39.15	94	1.18	333	4.18	62	3.00	17	.82	3	.14
Diarrheal diseases, others	35,303	442.96	57	.72	83	1.04	1,858	89.80	6	.29	1	.05
Enteritis	1,500	18.82	16	.20	29	.36	98	4.74	2	.10	.....	.....
Perityphlitis and appendicitis	199	2.50	8	.10	17	.21	60	2.90	1	.05	3	.14
Digestive system, others	3,751	47.07	35	.44	31	.43	710	34.32	19	.92	4	.19
Total diseases of the digestive system	62,128	779.53	244	3.06	743	9.32	7,015	339.05	47	2.27	15	.72
Heart, diseases of	402	5.04	50	.63	30	.38	122	5.90	35	1.69	13	.63
Arteries and veins	182	2.28	20	.25	4	.05	34	1.64	12	.58	3	.14
Total diseases of the circulatory system	584	7.33	70	.88	34	.43	156	7.54	47	2.27	16	.77
Bronchitis	3,128	39.25	7	.09	.....	.....	1,746	84.39	5	.24	.....	.....
Pneumonia	182	2.28	2	.03	33	.41	88	4.25	.....	.....	7	.34
Pleurisy	317	3.98	15	.19	6	.08	92	4.45	5	.24	1	.05
Respiratory system, others	1,324	16.61	16	.20	7	.09	801	38.72	9	.43	2	.10
Total diseases of the respiratory system	4,951	62.12	40	.50	46	.58	2,727	131.80	19	.92	10	.48
Kidneys, diseases of	292	3.66	16	.20	39	.49	78	3.77	16	.77	8	.39
Varicocele	324	4.07	6	.08	.....	.....	68	3.29	15	.73	.....	.....
Genito-urinary, others	939	11.78	6	.08	1	.01	229	11.07	16	.77	.....	.....
Total diseases of the genito-urinary system	1,555	19.51	28	.35	40	.50	375	18.12	47	2.27	8	.39
Adenitis	642	8.06	3	.04	.....	.....	100	4.83	2	.10	.....	.....
Lymphatic system, others	85	1.07	3	.04	1	.01	12	.58	.....	.....	.....	.....
Total diseases of the lymphatic system	727	9.12	6	.08	1	.01	112	5.41	2	.10	.....	.....
Rheumatism, muscular	2,944	36.94	15	.19	.....	.....	1,045	50.51	7	.34	.....	.....
Osteitis and periostitis	155	1.94	6	.08	.....	.....	38	1.84	2	.10	.....	.....
Arthritis and synovitis	708	8.88	15	.19	1	.01	224	10.83	11	.53	.....	.....
Rheumatism, chronic articular	533	6.69	52	.65	.....	.....	143	6.91	14	.68	.....	.....
Muscles, bones, and joints, others	352	4.42	29	.36	.....	.....	100	4.83	21	1.01	.....	.....
Total diseases of the muscles, bones, and joints	4,692	58.87	117	1.47	1	.01	1,550	74.92	55	2.66	.....	.....

TABLE IV.—*Armies, Regular and Volunteer, 1900—Admissions to sick report, discharges, and deaths from various causes, etc.*—Continued.

Year 1900.	Total islands and China.						United States (continental).					
Mean strength	79,699						20,690					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Total diseases of the integumentary system	16,983	213.09	4	0.05	1	0.01	1,873	90.53	6	0.29	.....	.....
Total diseases of the eye	1,220	15.31	50	.63	.....	.....	308	14.89	45	2.17	.....	.....
Total diseases of the ear	1,387	17.40	82	1.03	.....	.....	174	8.41	29	1.40	.....	.....
Total diseases of the nose	74	.93	5	.06	.....	.....	33	1.59	6	.29	.....	.....
Total unclassified and undiagnosed	719	9.02	.....	.....	1	.01	75	3.62	.....	.....	3	0.14
Total for diseases	186,662	2,342.09	1,105	13.86	1,485	18.63	25,715	1,242.87	673	32.52	100	4.83
Drowning	6	.08	.....	.....	78	.98	1	.05	.....	.....	38	1.84
Exhaustion from exposure and fatigue	707	8.87	2	.03	2	.03	43	2.08	.....	.....	.....	.....
Heat stroke	181	2.27	6	.08	9	.11	14	.68	2	.10	.....	.....
Lightning stroke	4	.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Venomous bites, stings, and wounds	748	9.39	1	.01	1	.01	107	5.17	2	.10	.....	.....
Abrasions, blisters, burns, and scalds	2,042	25.62	.....	.....	1	.01	473	22.86	.....	.....	.....	.....
Compression and concussion of brain	27	.34	2	.03	3	.04	11	.53	1	.05	1	.05
Contusions and sprains	4,811	60.37	2	.03	.....	.....	2,761	133.43	2	.10	.....	.....
Dislocations	179	2.25	5	.06	.....	.....	88	4.25	4	.19	.....	.....
Fractures (not shot)	470	5.90	19	.24	10	.13	240	11.60	25	1.21	1	.05
Hernia	499	6.26	68	.85	.....	.....	93	4.49	34	1.64	.....	.....
Wounds, contused, lacerated, and punctured	1,575	19.76	3	.04	3	.04	777	37.55	3	.14	2	.10
Wounds, incised	953	11.96	6	.08	56	.70	304	14.69	.....	.....	2	.10
Wounds, gunshot	1,116	14.00	213	2.67	460	5.77	57	2.75	22	1.06	11	.53
Secondary results of injury	320	4.02	18	.23	2	.03	120	5.80	40	1.93	.....	.....
Other injuries	518	6.50	6	.08	12	.15	458	22.14	5	.24	6	.29
Total for injuries	14,156	177.62	351	4.40	637	7.99	5,547	268.10	140	6.77	61	2.95
Total for diseases and injuries	200,818	2,519.70	1,456	18.27	2,122	26.63	31,262	1,510.97	813	39.29	161	7.78

TABLE V.—*Armies, Regular and Volunteer, 1900.—Admissions to sick report, discharges, and deaths from various causes, with their ratios per thousand of mean strength, arranged by arms of the service.*

Year 1900.	Infantry.						Cavalry.						Artillery.					
Mean strength	65,688						13,500						11,125					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	4	0.06					1	0.07			1	0.07						
Measles	374	5.69			6	0.09	33	2.44					85	7.64				
Smallpox	226	3.44			110	1.67	10	.74			3	.22	5	.45				
Vaccinia	950	14.46					334	24.74					352	31.64				
Influenza	696	10.60					280	20.74					353	31.73				
Dengue	2,718	41.38					237	17.55					154	13.84				
Mumps	399	6.07					47	3.48					67	6.02				
Diphtheria	27	.41			3	.05	7	.52			1	.07	8	.72				
Typhoid fever	690	10.50	2	0.03	138	2.10	132	9.78			17	1.26	82	7.37	1	0.09	4	0.36
Yellow fever	30	.46			10	.15	60	4.44			11	.81	18	1.62			3	.27
Cerebro spinal fever	10	.15			9	.14	1	.07			1	.07						
Malarial fever, intermittent	43,644	664.41	2	.03			7,718	571.71					2,788	250.61				
Malarial fever, remittent	9,186	139.84			18	.27	1,405	104.07			5	.37	711	63.91				
Malarial fever, pernicious	187	2.84	1	.02	87	1.32	21	1.56			5	.37	7	.63			1	.09
Malarial cachexia	2,546	38.72	31	.47	11	.17	282	20.89	2	0.15	3	.22	135	12.13	5	.45	1	.09
Fever, undetermined	1,887	28.73			1	.02	143	10.59					109	9.80			1	.09
Erysipelas	55	.84			1	.02	8	.59					18	1.62				
Septicæmia and tetanus	24	.37			16	.24	5	.37	1	.07	3	.22	2	.18				
Rheumatic fever	322	4.90	1	.02	1	.02	54	4.00	1	.07			25	2.25				
Consumption	335	5.10	71	1.08	82	1.25	58	4.30	24	1.78	1	.30	34	1.83	24	2.16	8	.72
Cancer	10	.15	1	.02			1	.07			1	.07	4	.36	2	.18		
Syphilis and results	974	14.83	75	1.14	2	.03	333	24.67	48	3.56	1	.07	214	19.24	41	3.69	1	.09
Gonorrhœa and results	4,624	70.40	15	.23			1,505	111.48	23	1.70			1,186	106.61	13	1.17		
Chancroid and results	2,548	38.79	4	.06	1	.02	696	51.56	1	.07			517	46.47				
Infections, other	99	1.51	6	.09	4	.06	17	1.26			1	.07	27	2.43	2	.18	1	.09
Total infectious diseases	72,562	1,104.65	209	3.18	500	7.61	13,388	991.70	100	7.41	57	4.22	6,921	622.11	88	7.92	20	1.80
Anæmia	382	5.82	2	.03	5	.08	38	2.81	1	.07			58	5.21	1	.09	1	.09
Nutrition, others	77	1.17	4	.06	1	.02	16	1.19	10	.74			9	.81	28	2.52		
Total diseases of nutrition	459	6.99	6	.09	6	.09	54	4.00	11	.81			67	6.02	29	2.61	1	.09

TABLE V.—*Armies, Regular and Volunteer, 1900—Admissions to sick report, discharges, and deaths from various causes, etc.*—Continued.

Year 1900.	Infantry						Cavalry.						Artillery.					
Mean strength	65,688						13,500						11,125					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Alcoholism	923	14.05	8	0.12	14	0.21	182	13.48	1	0.07	2	0.15	311	27.95	1	0.09	2	0.18
Brain and spinal cord	297	4.52	62	.94	13	.20	41	3.04	15	1.11	.....	.....	28	2.52	13	1.17	1	.09
Insanity	221	3.36	106	1.61	3	.05	23	1.70	21	1.56	.....	.....	14	1.26	10	.90	.....	.....
Meningitis	21	.32	1	.02	4	.06	2	.15	.....	.....	1	.07	3	.27	.....	.....	.....	.....
Poisoning, narcotic	39	.59	1	.02	4	.06	13	.96	3	.22	3	.22	8	.72	1	.09	1	.09
Nervous system, others	1,615	24.59	44	.67	4	.06	424	31.41	7	.52	1	.07	348	31.28	10	.90	.....	.....
Total diseases of the nervous system	3,116	47.44	222	3.38	42	.64	685	50.74	47	3.48	7	.52	712	64	35	3.15	4	.36
Poisoning, irritant	146	2.22	2	.03	1	.02	34	2.52	.....	.....	.....	.....	93	8.36	.....	.....	1	.09
Tonsillitis, pharyngitis, and sore throat	1,874	28.53	.....	.....	.....	.....	722	53.48	.....	.....	.....	.....	553	49.71	.....	.....	.....	.....
Peritonitis	23	.35	.....	.....	12	.18	3	.22	.....	.....	1	.07	2	.18	.....	.....	1	.09
Dyspepsia, colic, and constipation	5,689	86.62	5	.08	.....	.....	1,262	93.48	2	.15	.....	.....	1,204	108.23	.....	.....	.....	.....
Gastritis	2,826	43.03	19	.29	4	.06	419	31.04	1	.07	.....	.....	151	13.57	.....	.....	.....	.....
Dysentery, acute	5,235	79.70	5	.08	203	3.09	682	50.52	2	.15	16	1.19	217	19.51	.....	.....	1	.09
Dysentery, chronic	2,675	40.72	88	1.34	301	4.58	283	20.96	10	.74	22	1.63	87	7.82	10	.90	7	.63
Diarrheal diseases, others	29,905	455.26	55	.84	80	1.22	3,886	287.85	6	.44	3	.22	2,363	212.41	.....	.....	.....	.....
Enteritis	1,161	17.67	12	.18	26	.40	237	17.55	1	.07	1	.07	110	9.89	2	.18	1	.09
Perityphlitis and appendicitis	166	2.53	6	.09	17	.26	38	2.81	.....	.....	2	.15	34	3.06	3	.27	.....	.....
Digestive system, others	3,172	48.29	33	.50	31	.47	619	45.85	3	.22	4	.30	447	40.18	16	1.44	2	.18
Total diseases of the digestive system	52,872	804.90	225	3.43	675	10.28	8,185	606.30	25	1.85	49	3.63	5,261	472.90	31	2.79	13	1.17
Heart, diseases of	349	5.31	47	.72	29	.44	79	5.85	23	1.70	6	.44	46	4.13	7	.63	.....	.....
Arteries and veins	144	2.19	17	.26	4	.06	28	2.07	2	.15	.....	.....	23	2.07	5	.45	1	.09
Total diseases of the circulatory system	493	7.51	64	.97	33	.50	107	7.93	25	1.85	6	.44	69	6.20	12	1.08	1	.09
Bronchitis	2,864	43.60	6	.09	.....	.....	756	56.00	2	.15	.....	.....	790	71.01	2	.18	.....	.....
Pneumonia	171	2.60	1	.02	30	.46	47	3.48	.....	.....	6	.44	25	2.25	1	.09	2	.18
Pleurisy	258	3.93	14	.21	4	.06	66	4.89	4	.30	2	.15	41	3.69	1	.09	.....	.....
Respiratory system, others	1,295	19.71	16	.24	6	.09	213	15.78	1	.07	1	.07	420	37.75	2	.18	1	.09
Total diseases of the respiratory system	4,588	69.85	37	.56	40	.61	1,082	80.15	7	.52	9	.67	1,276	114.70	6	.54	3	.27

Kidneys, diseases of	238	3.62	19	.29	32	.49	63	4.67	5	.37	7	.52	27	2.43	3	.27	4	.36
Varicocele	218	3.32	2	.03	.....	.....	90	6.67	4	.30	.....	.....	58	5.21	8	.72	.....	.....
Genito-urinary, others	788	12	11	.17	.....	.....	178	13.18	1	.07	1	.07	142	12.76	6	.54	.....	.....
Total diseases of the genito-urinary system	1,244	18.94	32	.49	32	.49	331	24.52	10	.74	8	.59	227	20.41	17	1.53	4	.36
Adenitis	491	7.47	2	.03	.....	.....	149	11.04	.....	.....	.....	.....	71	6.38	3	.27	.....	.....
Lymphatic system, others	68	1.04	3	.05	.....	.....	15	1.11	.....	.....	1	.07	11	.99	.....	.....	.....	.....
Total diseases of the lymphatic system	559	8.51	5	.08	.....	.....	164	12.15	.....	.....	1	.07	82	7.37	3	.27	.....	.....
Rheumatism, muscular	2,560	38.97	17	.26	.....	.....	588	43.55	3	.22	.....	.....	571	51.33	2	.18	.....	.....
Osteitis and periostitis	140	2.13	2	.03	.....	.....	30	2.22	3	.22	.....	.....	10	.90	3	.27	.....	.....
Arthritis and synovitis	602	9.16	15	.23	1	.02	146	10.81	5	.37	.....	.....	122	10.97	6	.54	.....	.....
Rheumatism, chronic articular	459	6.99	14	.67	.....	.....	99	7.33	10	.74	.....	.....	54	4.85	8	.72	.....	.....
Muscles, bones, and joints, others	254	3.87	33	.50	.....	.....	105	7.78	9	.67	.....	.....	67	6.02	6	.54	.....	.....
Total diseases of the muscles, bones, and joints	4,015	61.13	111	1.69	1	.02	968	71.71	30	2.22	.....	.....	824	74.07	25	2.25	.....	.....
Total diseases of the integumentary system	13,644	207.71	5	.08	1	.02	2,848	210.96	1	.07	.....	.....	1,796	161.44	4	.36	.....	.....
Total diseases of the eye	1,019	15.51	52	.79	.....	.....	221	16.37	18	1.33	.....	.....	175	15.73	19	1.71	.....	.....
Total diseases of the ear	1,111	16.91	78	1.19	.....	.....	181	13.41	8	.59	.....	.....	166	14.92	16	1.44	.....	.....
Total diseases of the nose	59	.90	4	.06	.....	.....	19	1.41	5	.37	.....	.....	17	1.53	2	.18	.....	.....
Total unclassified and undiagnosed	681	10.37	.....	.....	2	.03	54	4.00	.....	.....	2	.15	18	1.62	.....	.....	.....	.....
Total for diseases	156,422	2,381.29	1,050	15.98	1,332	20.28	28,287	2,095.33	287	21.26	139	10.30	17,611	1,583.01	287	25.80	46	4.13
Drowning	2	.03	.....	.....	66	1.00	3	.22	.....	.....	16	1.19	2	.18	.....	.....	27	2.43
Exhaustion from exposure and fatigue	641	9.76	1	.02	2	.03	47	3.48	.....	.....	.....	.....	24	2.16	1	.09	.....	.....
Heat stroke	136	2.07	5	.08	8	.12	34	2.52	2	.15	1	.07	15	1.35	.....	.....	.....	.....
Lightning stroke	4	.06	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Venomous bites, stings, and wounds	610	9.29	1	.02	.....	.....	112	8.30	.....	.....	1	.07	81	7.28	1	.09	.....	.....
Abrasions, blisters, burns, and scalds	1,758	26.76	.....	.....	.....	.....	388	28.74	.....	.....	1	.07	269	23.28	.....	.....	.....	.....
Compression and concussion of brain	18	.27	2	.03	3	.05	8	.59	.....	.....	1	.07	10	.90	1	.09	.....	.....
Contusions and sprains	3,431	52.23	1	.02	.....	.....	2,312	171.26	3	.22	.....	.....	1,429	128.45	.....	.....	.....	.....
Dislocations	140	2.13	2	.03	.....	.....	66	4.89	4	.30	.....	.....	47	4.22	2	.18	.....	.....
Fractures (not shot)	353	5.37	17	.26	3	.05	175	12.96	14	1.04	3	.22	119	10.70	9	.84	1	.36
Hernia	418	6.36	61	.93	.....	.....	90	6.67	22	1.63	.....	.....	36	3.24	7	.63	.....	.....
Wounds, contused, lacerated, and punctured	1,240	18.88	3	.05	2	.03	621	46.00	1	.07	.....	.....	374	33.62	2	.18	2	.18
Wounds, incised	809	12.32	6	.09	54	.82	206	15.26	.....	.....	1	.07	192	17.26	.....	.....	.....	.....
Wounds, gunshot	981	14.93	201	3.06	411	6.26	131	9.70	18	1.33	46	3.41	35	3.15	7	.63	9	.81
Secondary results of injury	259	3.94	23	.35	.....	.....	82	6.07	12	.89	2	.15	76	6.83	20	1.80	.....	.....
Other injuries	367	5.59	1	.06	8	.12	299	22.15	4	.30	3	.22	208	18.70	2	.18	1	.09
Total for injuries	11,167	170.00	327	4.98	557	8.48	4,574	338.82	80	5.93	75	5.56	2,907	261.31	52	4.67	43	3.87
Total for diseases and injuries	167,589	2,551.29	1,377	20.96	1,889	28.76	32,861	2,434.15	367	27.19	214	15.86	20,518	1,844.32	339	30.47	89	8.00

TABLE V.—*Armies, Regular and Volunteer, 1900—Admissions to sick report, discharges, and deaths from various causes, etc.*—Continued.

Year 1900.	Engineers.						Ordnance.						Signal Corps.					
Mean strength	680						726						711					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Measles	1	1.47					1	1.38					1	1.41				
Smallpox	1	1.47											2	2.81			1	1.41
Vaccinia	15	22.06					13	17.91					5	7.03				
Influenza	7	10.29					54	74.38					19	26.72				
Dengue	3	4.41											19	26.72				
Mumps							1	1.38					2	2.81				
Diphtheria													2	2.81				
Typhoid fever	3	4.41					4	5.51			1	1.38	8	11.25				
Yellow fever													7	9.85			2	2.81
Malarial fever, intermittent	243	357.36					45	61.98					234	329.11				
Malarial fever, remittent	68	100					3	4.13					33	46.41			1	1.41
Malarial fever, pernicious																	1	1.41
Malarial cachexia	9	13.23					2	2.75					10	14.06				
Fever, undetermined	4	5.88					1	1.38					7	9.85				
Erysipelas							3	4.13										
Rheumatic fever							3	4.13					8	11.25				
Consumption	4	5.88	2	2.94	1	1.47							10	14.06	1	1.41	1	1.41
Syphilis and results	9	13.23					1	1.38					6	8.44				
Gonorrhea and results	29	42.65					6	8.26					36	50.63	2	2.81		
Chancroid and results	19	27.94					1	1.38					19	26.72				
Total infectious diseases	415	610.29	2	2.94	1	1.47	138	190.08			1	1.38	428	601.97	3	4.22	6	8.44
Anæmia							1	1.38					3	4.22				
Nutrition, others	1	1.47					1	1.38					1	1.41				
Total diseases of nutrition	1	1.47					2	2.75					4	5.63				
Alcoholism	9	13.23					11	15.15					15	21.10				
Brain and spinal cord	2	2.94					2	2.75			1	1.38	1	1.41				
Insanity	1	1.47											1	1.41				
Poisoning, narcotic	1	1.47																
Nervous system, others	19	27.94					22	30.30					18	25.32	1	1.41		
Total diseases of the nervous system	32	47.06					35	48.21			1	138	35	49.24	1	1.41		

Poisoning, irritant	1	1.47					1	1.38										
Tonsillitis, pharyngitis, and sore throat	11	16.18					32	44.08					12	16.88				
Dyspepsia, colic, and constipation	46	67.65					44	60.61					24	33.75				
Gastritis	28	41.18					7	9.64					17	23.91				
Dysentery, acute	22	32.36					1	1.38					34	47.82			1	1.41
Dysentery, chronic	27	39.71	2	2.94	2	2.94							16	22.50			1	1.41
Diarrheal diseases, others	184	270.59					50	68.87					89	125.18				
Enteritis	11	16.18					5	6.89					7	9.85				
Perityphlitis and appendicitis													2	2.81				
Digestive system, others	16	23.53					22	30.30					16	22.50	1	1.41		
Total diseases of the digestive system	346	508.82	2	2.94	2	2.94	162	223.14					217	305.20	1	1.41	2	2.81
Heart, diseases of	13	19.12	1	1.47	1	1.47	3	4.13			4	5.51	2	2.81				
Arteries and veins	3	4.41					2	2.75										
Total diseases of the circulatory system	16	23.53	1	1.47	1	1.47	5	6.89			4	5.51	2	2.81				
Bronchitis	33	48.53	1	1.47			35	48.21					34	47.82				
Pneumonia	2	2.94					2	2.75			1	1.38	1	1.41				
Pleurisy	1	1.47					2	2.75					6	8.44				
Respiratory system, others	20	29.41					33	45.46	1	1.38			3	4.22				
Total diseases of the respiratory system	56	82.35	1	1.47			72	99.17	1	1.38	1	1.38	44	61.88				
Kidneys, diseases of	3	4.41			1	1.47	1	1.38					3	4.22				
Varicocele	2	2.94											1	1.41				
Genito-urinary, others	7	10.29					2	2.75										
Total diseases of the genito-urinary system	12	17.64			1	1.47	3	4.13					4	5.63				
Adenitis	4	5.88					5	6.89										
Total diseases of the lymphatic system	4	5.88					5	6.89										
Rheumatism, muscular	20	29.41					61	84.02					6	8.44				
Osteitis and periostitis													5	7.03				
Arthritis and synovitis	16	23.53					9	12.40					4	5.63				
Rheumatism, chronic articular	6	8.82					7	9.64										
Muscles, bones, and joints, others	2	2.94	1	1.47			3	4.13					1	1.41				
Total diseases of the muscles, bones, and joints	44	64.71	1	1.47			80	110.19					16	22.50				
Total diseases of the integumentary system	59	86.77					44	60.61					57	80.17				
Total diseases of the eye	15	22.06					13	17.91					6	8.44	1	1.41		
Total diseases of the ear	19	27.94	1	1.47			6	8.26	1	1.38			13	18.28				
Total diseases of the nose	3	4.41					1	1.38					3	4.22				
Total unclassified and undiagnosed							7	9.64					1	1.41				
Total for diseases	1,022	1,502.94	8	11.76	5	7.35	573	789.25	2	2.75	7	9.64	830	1,167.37	6	8.44	8	11.25

TABLE V.—*Armies, Regular and Volunteer, 1900—Admissions to sick report, discharges, and deaths from various causes, etc.*—Continued.

Year 1900.	Engineers.						Ordnance.						Signal Corps.					
Mean strength	680						726						711					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Death.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Drowning					1	1.47					1	1.38						
Exhaustion from exposure and fatigue	1	1.47					1	1.38					7	9.85				
Heat stroke	4	5.88	1	1.47			1	1.38					2	2.81				
Venomous bites, stings, and wounds	5	7.35	1	1.47			1	1.38					4	5.63				
Abrasions, blisters, burns, and scalds	7	10.29					3	4.13					2	2.81				
Compression and concussion of brain													1	1.41				
Contusions and sprains	49	72.06					55	75.76					17	23.91				
Dislocations							3	4.13										
Fractures (not shot)	5	7.35					5	6.89					7	9.85			1	1.41
Hernia	5	7.35	2	2.94			1	1.38										
Wounds, contused, lacerated, and punctured	14	20.59					15	20.66			1	1.38	8	11.25				
Wounds, incised	10	14.70					2	2.75					3	4.22			3	4.22
Wounds, gunshot	2	2.94	1	1.47	1	1.47							3	4.22			3	4.22
Secondary results of injury	7	10.29					1	1.38					1	1.41				
Other injuries	6	8.82					13	17.91					2	2.81			3	4.22
Total for injuries	115	169.12	5	7.35	2	2.94	101	139.12			2	2.75	57	80.17			10	14.06
Total for diseases and injuries	1,137	1,672.06	13	19.12	7	10.29	674	928.37	2	2.75	9	12.40	887	1,247.54	6	8.44	18	25.32

TABLE V.—*Armies, Regular and Volunteer, 1900—Admissions to sick report, discharges, and deaths from various causes, etc.*—Continued.

Year 1900.	Medical Corps.						Others.					
Mean strength	4,283						3,676					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	1	0.23										
Measles	29	6.77			1	0.23	44	11.97				
Smallpox	11	2.57					6	1.63				
Vaccinia	29	6.77					338	91.95				
Influenza	81	18.91					142	38.63			1	0.27
Dengue	181	42.26					9	2.45				
Mumps	16	3.74					37	10.06				
Diphtheria	1	.23										
Typhoid fever	44	10.27			3	.70	15	4.08			1	.27
Yellow fever	19	4.44			2	.47	10	2.72			4	1.09
Malarial fever, intermittent	755	176.28					387	105.28				
Malarial fever, remittent	394	91.99			1	.23	31	8.43				
Malarial fever, pernicious	5	1.17			1	.23					1	.27
Malarial cachexia	64	14.94	2	0.47			17	4.62				
Fever, undetermined	54	12.61					18	4.90				
Erysipelas	3	.70					18	4.90				
Septicæmia and tetanus	1	.23			1	.23						
Rheumatic fever	16	3.74					5	1.36				
Consumption	22	5.14	9	2.10			11	2.99	6	1.63		
Cancer							1	.27				
Syphilis and results	37	8.64	6	1.40	1	.23	15	4.08	4	1.09		
Gonorrhœa and results	202	47.16	3	.70			311	84.60	2	.54		
Chancroid and results	85	19.85					75	20.40				
Infections, other	7	1.63	1	.23			3	.82				
Total infectious diseases	2,057	480.27	21	4.90	10	2.33	1,493	406.15	12	3.26	7	1.90
Anæmia	10	2.33					4	1.09				
Nutrition, others	7	1.63	2	.47			2	.54	12	3.26		
Total diseases of nutrition	17	3.97	2	.47			6	1.63	12	3.26		
Alcoholism	52	12.14	3	.70			37	10.06				
Brain and spinal cord	11	2.57	5	1.17			13	3.54	4	1.09	2	.54
Insanity	10	2.33	9	2.10			3	.82	3	.82		

INTERNATIONAL TABLE I.—*Examination of recruits during the year 1900.*

No.		White.	Colored.	Total.
1	Total number recruits examined	38,115	1,801	39,916
	Of each 1,000 of these—			
2	Were accepted for service	558.68	657.97	563.16
3	Were rejected for under height	4.75	6.11	4.81
4	Were rejected for disabilities	360.80	292.06	357.70
	Of each 1,000 accepted recruits the heights were as follows (in inches):			
5	Under 61	.23	.84	.27
6	61 to 62	.23	1.69	.31
7	62 to 63	1.41	3.37	1.51
8	63 to 64	11.88	15.19	12.06
9	64 to 65	96.98	84.39	96.31
10	65 to 66	135.91	135.02	135.86
11	66 to 67	169.63	184.81	170.43
12	67 to 68	185.73	186.50	185.77
13	68 to 69	155.96	145.99	155.43
14	69 to 70	111.44	114.77	111.62
15	70 to 71	70.72	64.98	70.42
16	71 to 72	34.38	33.75	34.34
17	72 to 73	15.40	18.57	15.57
18	73 to 74	7.14	9.29	7.25
19	74 upward	2.96	.84	2.85
	Causes of rejection (exclusive of under height) expressed in ratios per 1,000 of examined recruits:			
20	Physical debility	1.10	2.22	1.15
21	Tuberculosis of lungs or other organs	3.23	2.78	3.21
22	Imperfect vision	56.57	33.87	55.79
23	Heart disease	32.66	17.77	31.99
24	Goiter	.39	.....	.38
25	Varicose veins, varicocele, hemorrhoids	56.43	23.88	54.99
26	Hernia	13.43	14.44	13.48
27	Flat feet	4.91	2.78	4.79

INTERNATIONAL TABLE III.—*Movements of sick by branches of military service and by months.*

VOLUNTEERS AND REGULARS, 1900.

	Absolute numbers.				Proportions per 1,000.			
			Sick disposed of.		In 1,000 of mean strength there were—		In 1,000 sick disposed of there were[1]—	
	Mean strength.	Sick admissions.	Total.[1]	As fit for duty (recovered).[1]	By death.	Total sick admissions.	Deaths.	Fit for duty (recovered).	Deaths.
ARM OF SERVICE.									
Infantry	65,688	167,589	.....	.....	1,889	2,551.29	28.76	.....	.....
Cavalry	13,500	32,861	.....	.....	214	2,434.15	15.85	.....	.....
Artillery	11,125	20,518	.....	.....	89	1,844.32	8.00	.....	.....
Ordnance	726	674	.....	.....	9	928.37	12.40	.....	.....
Engineers	680	1,137	.....	.....	7	1,672.06	10.29	.....	.....
Signal Corps	711	887	.....	.....	18	1,247.54	25.32	.....	.....
Medical Department	4,283	4,630	.....	.....	37	1,081.02	8.64	.....	.....
All others	3,676	3,784	.....	.....	20	1,029.38	5.44	.....	.....
MONTH.									
January	99,061	21,178	.....	.....	198	213.79	2.00	.....	.....
February	99,349	19,364	.....	.....	166	194.92	1.67	.....	.....
March	99,411	20,755	.....	.....	186	208.78	1.87	.....	.....
April	99,741	19,551	.....	.....	142	196.02	1.42	.....	.....
May	99,526	20,076	.....	.....	170	201.72	1.71	.....	.....
June	99,821	20,978	.....	.....	182	210.16	1.82	.....	.....
July	100,907	21,881	.....	.....	231	216.84	2.29	.....	.....
August	101,908	20,943	.....	.....	243	205.51	2.38	.....	.....
September	101,871	17,585	.....	.....	247	172.61	2.42	.....	.....
October	101,672	17,365	.....	.....	194	170.80	1.91	.....	.....
November	101,184	15,875	.....	.....	161	156.90	1.59	.....	.....
December	100,210	16,529	.....	.....	163	164.95	1.63	.....	.....

[1] Information not tabulated.

INTERNATIONAL TABLE VI.—*Admissions of important diseases by branches of military service.*

VOLUNTEERS AND REGULARS, 1900.

No.	Diseases of the international nosological table.	Absolute number of admissions.								Admissions per 1,000 of mean strength.							
		Infantry.	Cavalry.	Artillery.	Ordnance.	Engineers.	Signal Corps.	Medical Department.	All others.	Infantry.	Cavalry.	Artillery.	Ordnance.	Engineers.	Signal Corps.	Medical Department.	All others.
1	Alcoholismus acutus, including delirium tremens	923	182	311	11	9	15	52	37	14.05	13.18	27.95	[illegible]	13.25	21.19	12.11	10.06
2	Bronchitis, all[1]	2,864	756	799	35	33	34	106	256	43.60	56	71.91	48.21	48.48	47.82	24.[illegible]	39.64
3	Cholera asiatica																
4	Choleri nostras[2]																
5	Diphtheria	27	7	8				1		.41	.52	.72			2.81	.35	
6	Dysenteria	7,910	965	301	1	49	40	214	26	120.42	71.48	27.33	1.38	72.07	70.32	19.95	7.05
7	Erysipelas	53	8	18	3			3	18	.81	.59	1.62	4.15			.70	4.98
8	Febris (intermittens (malarica)	13,881	7,739	2,783	45	243	234	709	387	1067.26	573.27	241.24	61.98	343.[illegible]	299.11	177.43	105.[illegible]
9	Febris recurrens	11,729	1,087	846	5	77	43	458	48	178.56	124.96	76.04	6.88	113.28	69.[illegible]	106.93	13.[illegible]
10	Gonorrhœa	4,624	1,305	1,186	6	29	36	302	311	70.40	111.18	106.61	8.28	42.65	9.43	17.[illegible]	34.[illegible]
11	Hernia	118	90	56	1	3		24	24	6.36	6.67	3.24	1.38	7.[illegible]		4.30	1.74
12	Influenza	696	280	363	54	7	13	81	142	10.60	20.74	31.78	74.28	10.[illegible]	26.[illegible]	18.21	8.[illegible]
13	Insolatio—Hitzschlag, Coup de chaleur	136	34	15	1	1	2	2	1	2.07	2.52	1.35	1.38	1.48	2.81		.87
14	Meningitis cerebro spinalis epidemica	10	1							.15	.07						
15	Morbilli	374	23	85	1	1	1	29	44	5.69	2.44	7.61	1.38	1.48	1.40	.87	13.[illegible]
16	Parotitis epidemica	299	47	67	1		2	16	37	6.07	5.48	6.03	1.38		2.81	3.[illegible]	10.[illegible]
17	Pneumonia crouposa sive lobaris	171	17	36	2	2	1	8	14	2.60	1.78	3.25	2.76	2.96	1.40	1.74	3.[illegible]
18	Rheumatismus articulorum	781	163	59	10	6	8	15	25	11.89	11.83	5.30	13.77	8.87	11.[illegible]	10.[illegible]	7.[illegible]
19	Scarlatina	4	1					1		.06	.07					.43	
20	Scabiæ																
21	Syphilis	574	303	214	1	9	6	35	15	14.85	24.67	19.21	1.38	12.[illegible]	8.43	8.64	4.08
22	Tetanus[2]																
23	Tuberculosis pulmonum	235	38	54		4	10	22	11	3.10	3.10	4.85		.88	14.06	3.[illegible]	3.[illegible]
24	Tuberculosis cæterorum organorum																
25	Typhus abdominalis	690	132	82	4	3	8	14	15	10.50	9.[illegible]	7.[illegible]	5.51	4.41	11.[illegible]	10.[illegible]	4.08
26	Typhus exanthematicus[2]																
27	Variola	226	10	3		1	2	11	6	3.41	.74	1.[illegible]		1.48	2.81	2.[illegible]	1.[illegible]
28	Morbi ætiis	1,111	181	166	6	19	13	46	19	16.91	13.41	34.[illegible]	8.[illegible]	5.[illegible]	18.[illegible]	10.[illegible]	15.[illegible]
29	Morbi cardiis	349	79	46	1	13	3	14	18	5.31	5.85	4.[illegible]	4.13	19.[illegible]	4.[illegible]	3.[illegible]	4.[illegible]
30	Morbi cutis	13,644	2,848	1,596	54	59	37	276	196	205.71	210.96	161.44	99.[illegible]	86.[illegible]	26.[illegible]	3.[illegible]	1.[illegible]
31	Morbi genitalium	221	23	11	1	1	1	10	3	3.36	1.70	1.[illegible]		1.48	1.43	.87	
32	Morbi oculi	1,019	221	175	13	15	6	45	24	15.51	16.37	15.[illegible]	1.91	5.[illegible]	8.44	10.[illegible]	9.[illegible]
33	Morbi systematis nervosi (excl. vener. et syphilis)	1,244	341	225	3	12	1	39	30	18.91	24.[illegible]	20.41	4.[illegible]	17.[illegible]	5.[illegible]	13.[illegible]	13.[illegible]

[1] Acute not tabulated separately.

[2] Not tabulated separately.

[3] Including maternal cachexia.

INTERNATIONAL TABLE VII.—*Admissions of important diseases by months (absolute numbers).*

VOLUNTEERS AND REGULARS, 1900.

No.	Diseases of the international nosological table.	Admissions by months.											
		Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	Alcoholismus acutus, including delirium tremens	110	114	147	129	156	114	142	115	119	132	124	138
2	Bronchitis, all[1]	549	500	487	397	280	237	249	350	317	439	453	586
3	Cholera asiatica												
4	Cholera nostras[2]												
5	Diphtheria et croup	11	3	3	2	7	3	2	1	2	1	3	7
6	Dysenteria	750	636	583	567	660	823	1,155	1,202	981	842	675	645
7	Erysipelas	6	3	15	10	9	5	10	21	8	7	2	2
8	Febris intermittens (malaria)	5,173	5,052	5,796	5,204	4,911	4,905	4,835	4,638	3,553	3,810	3,851	4,006
9	Febris recurrens	2,026	1,641	1,540	1,243	1,342	1,265	1,175	1,138	853	800	821	1,049
10	Gonorrhœa	553	599	669	595	599	659	683	770	628	744	678	722
11	Hernia	44	57	52	70	61	45	41	50	42	52	38	40
12	Influenza	128	119	339	293	145	86	62	31	29	61	46	293
13	Insolatio (Hitzschlag, coup de chaleur)	16	5	13	16	28	17	19	34	14	10	12	11
14	Meningitis cerebro spinalis epidemica		2	1	1	1			1		3	1	1
15	Morbilli	97	126	144	79	41	20	8	11	19	6	7	10
16	Parotitis epidemica	192	92	46	51	35	31	26	25	17	16	20	18
17	Pneumonia crouposa sive lobaris	36	28	22	31	16	17	17	21	11	19	21	31
18	Rheumatismus articulorum	107	82	88	102	86	85	82	92	97	115	81	89
19	Scarlatina			2	1						1	1	1
20	Scorbutus												
21	Syphilis	144	136	137	123	141	133	106	131	134	120	143	141
22	Trachoma[2]												
23	Tuberculosis pulmonum	39	30	35	39	35	44	51	56	36	48	29	52
24	Tuberculosis ceterorum organorum[2]												
25	Typhus abdominalis	111	61	111	67	99	64	70	122	88	79	63	43
26	Typhus exanthematicus												
27	Variola	50	43	34	27	12	18	28	13	5	10	16	5
28	Morbi auris	100	106	126	128	155	145	134	149	126	154	121	117
29	Morbi cordis	49	42	48	41	42	38	44	35	48	54	41	39
30	Morbi cutis	1,633	1,498	1,560	1,572	1,836	1,748	1,577	1,548	1,585	1,659	1,382	1,258
31	Morbi mentis	17	16	27	28	24	19	22	19	26	40	21	14
32	Morbi oculi	128	108	129	155	148	104	137	132	121	130	129	107
33	Morbi systemat. urin. et sexual (excl. ven. et syph.)	128	141	174	184	178	154	149	150	150	159	187	176

[1] Acute not tabulated separately.

[2] Not tabulated separately.

Respectfully submitted.

GEO. M. STERNBERG,
Surgeon-General, United States Army.

Hon. ELIHU ROOT, *Secretary of War.*

O

REPORT

OF THE

SURGEON-GENERAL OF THE ARMY

TO THE

SECRETARY OF WAR

FOR THE

FISCAL YEAR ENDING JUNE 30, 1902.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1902.

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REPORT

OF

THE SURGEON-GENERAL.

WAR DEPARTMENT, SURGEON GENERAL'S OFFICE,
Washington, D. C., September 6, 1902.

SIR: In rendering this report I have the honor to submit first, a statement of disbursements made during the fiscal year ended June 30, 1902.

FINANCIAL STATEMENT, 1902.[a]

Medical and hospital department, 1902.

Appropriated by act approved March 2, 1901		$2,000,000.00
Sales to Quartermaster's Department	$588.00	
Sales to civil government, Philippine Islands	23,206.69	
Sales to States and Territories for use of National Guards	2,266.64	
Other refundments during the year (including transfer settlement by Treasury Department to adjust appropriations, $619.31)	902.59	
		26,963.92
Total to be accounted for		2,026,963.92
Disbursed during the year:		
Expenses of medical supply depots	$493.02	
Medical supplies	286,804.37	
Medical attendance and medicines	11,240.50	
Medical expenses of recruiting	48,875.64	
Pay of nurses	3,975.95	
Pay of other employees	122,170.48	
Washing of hospital linen	40,960.43	
Expressage	127.60	
Notary fees	93.90	
		514,741.89
Transferred by Treasury settlements to adjust appropriations		333.54
Balances on hand June 30, 1902:		
In United States Treasury and in transit thereto	[b]$1,436,615.30	
In hands of disbursing officers—		
New York City	30,701.85	
Washington, D. C	11,661.20	
St. Louis, Mo. (and in transit thereto)	13,862.83	
San Francisco, Cal	7,551.57	
Havana, Cuba	676.81	
Manila, P. I	10,737.94	
Iloilo, P. I	64.92	
Pekin, China	16.07	
		1,511,888.49
Total accounted for		2,026,963.92

[a] The disbursements in this statement include settlements with public creditors made by the accounting officers of the Treasury and charged by them to these appropriations.

[b] Of this amount $1,000,000 was transferred July 1, 1902, to the appropriation "Medical and hospital department, 1903," by virtue of the act approved June 30, 1902.

Medical and hospital department, 1901.

Balances on hand July 1, 1901, acts of May 26, 1900, and March 3, 1901		$343,031.78
Sales to States for use of National Guards	$148.08	
Other refundments during the year (including transfer settlements by Treasury Department to adjust appropriations, $333.54)	777.95	
		926.03
Total to be accounted for		343,957.81
Disbursed during the year:		
Expenses of medical supply depots	$91.92	
Medical supplies	99,983.27	
Medical attendance and medicines	2,869.56	
Medical expenses of recruiting	4,662.50	
Pay of nurses	569.70	
Pay of other employees	6,412.55	
Washing of hospital linen	6,314.25	
		120,903.75
Transferred by Treasury settlement to adjust appropriations		619.31
Balances on hand June 30, 1902:		
In United States Treasury	$219,232.22	
In hands of disbursing officer, Washington, D. C.	3,202.53	
		222,434.75
Total accounted for		343,957.81

Medical and hospital department, 1900.

Balances on hand July 1, 1901, acts of March 3, 1899, and February 9, 1900		$110,222.28
Refundments during the year		77.07
Total to be accounted for		110,299.35
Disbursed during the year:		
Medical supplies	$5.37	
Medical attendance and medicines	192.31	
Medical expenses of recruiting	172.55	
Pay of employees	431.00	
Washing of hospital linen	22.35	
Exchange on funds to island possessions	28.65	
		852.23
Carried to surplus fund		109,447.12
Total accounted for		110,299.35

Medical and hospital department, 1899 and prior years.

Refundment during the year	$15.00
Carried to surplus fund	15.00

Medical and hospital department, certified claims.

Appropriated by act approved February 14, 1902	$662.01	
Appropriated by act approved July 1, 1902	4,226.66	
		$4,888.67
Disbursed		4,888.67

Appropriation for national defense, certified claims.

Appropriated by act approved July 1, 1902	$70.50
Disbursed	70.50

Reimbursement to contract nurses (traveling expenses).

Balance on hand July 1, 1901, act of June 6, 1900	$3,322.56
Disbursed during the year	19.88
Balance in United States Treasury June 30, 1902	3,302.68
Total accounted for	3,322.56

Artificial limbs, 1902.

Appropriated by act approved March 3, 1901	$125,000.00
Disbursed during the year	116,185.00
Balance on hand June 30, 1902	8,815.00

Artificial limbs, 1901.

Balance July 1, 1901, act of June 6, 1900	$16,185.39
Disbursed during the year	5,482.58
Balance on hand June 30, 1902	10,702.81

Artificial limbs, 1900.

Balance July 1, 1901, act of March 3, 1899	$36,334.00
Disbursed during the year	991.85
Carried to surplus fund	35,342.15
Total accounted for	36,334.00

Artificial limbs, 1899.

Balance July 1, 1901, act of July 1, 1898	$4.68
Carried to surplus fund	4.68

Artificial limbs, certified claims.

Appropriated by act approved—	
February 14, 1902	$121.96
July 1, 1902	41.76
Total to be accounted for	163.72
Disbursed	163.72

Appliances for disabled soldiers, 1902.

Appropriated by act approved March 3, 1901	$2,000.00
Disbursed during the year	1,375.35
Balance on hand June 30, 1902	624.65

Appliances for disabled soldiers, 1901.

Balance July 1, 1901, act of June 6, 1900	$545.48
Disbursed during the year	63.00
Balance on hand June 30, 1902	482.48

Appliances for disabled soldiers, 1900.

Balance July 1, 1901, act of March 3, 1899	$905.25
Carried to surplus fund	905.25

Army Medical Museum, 1902.

Appropriated by act approved March 2, 1901	$5,000.00
Disbursed during the year	2,838.44
Balance on hand June 30, 1902	2,161.56

Army Medical Museum, 1901.

Balance July 1, 1901, act of May 26, 1900	$2,110.30
Disbursed during the year	1,550.16
Balance on hand June 30, 1902	560.14

Army Medical Museum, 1900.

Balance July 1, 1901, act of March 3, 1899	$660.43
Carried to surplus fund	660.43

Library, Surgeon-General's Office, 1902.

Appropriated by act approved March 2, 1901	$10,000.00
Disbursed during the year	7,110.57
Balance on hand June 30, 1902	2,889.43

Library, Surgeon-General's Office, 1901.

Balance July 1, 1901, act of May 26, 1900	$3,324.13
Disbursed during the year	3,260.64
Balance on hand June 30, 1902	63.49

Library, Surgeon-General's Office, 1900.

Balance July 1, 1901, act of March 3, 1899	$11.21
Carried to surplus fund	11.21

Furnishing trusses to disabled soldiers (sections 1176, 1177, and 1178, Revised Statutes, and act of March 3, 1879).

Expended during the year	$7,016.66

Relief of citizens of the French West Indies (act approved May 13, 1902).

Drawn by the Medical Department of the Army	$5,000.00
Balance on hand June 30, 1902	5,000.00

ARTIFICIAL LIMBS AND THEIR COMMUTATION.

Under the provisions of law relating to artificial limbs there were furnished during the year ended June 30, 1902, 39 artificial legs, 1 arm, and 1 foot. Commutation certificates were issued for 133 cases of amputated leg, 79 of amputated arm, 12 of amputated foot, and for 2,029 cases of the loss of the use of a limb. These cases involved an expenditure of $116,185.

For the year ending June 30, 1903, the sum of $514,000 was estimated for and appropriated June 28, 1902.

During the year ending June 30, 1904, the cases which matured during the year ending June 30, 1901, and were paid out of the appropriation for that year will again require to be met. The disbursements from that appropriation amounted to $162,297.19. It is calculated from an examination of the records that about 7 or 8 per cent of the men on whose behalf this money was expended will have died before

the time when another benefit would become due, but this reduction in the number of beneficiaries will be in part offset by claimants disabled in the Spanish-American war and in the Philippines. In view of these considerations, it is estimated that the sum of $152,000 will suffice to cover disbursements under the laws relating to artificial limbs during the fiscal year 1904.

APPLIANCES FOR DISABLED SOLDIERS.

During the past year the sum of $1,438.35 was expended for 182 appliances issued to disabled soldiers.

TRUSSES.

The number of trusses issued and fitted during the year was 911, at a cost of $7,016.66.

CARE OF DESTITUTE PATIENTS IN THE PROVIDENCE HOSPITAL, WASHINGTON, D. C.

The act of Congress approved March 3, 1901, appropriated $19,000 for the support and medical treatment of destitute patients in the city of Washington, D. C., under a contract to be made with this hospital by the Surgeon-General of the Army. The relief afforded under this appropriation was as follows:

Patients in hospital July 1, 1901	102
Admitted during the year	1,215
Total number treated	1,317
Average number admitted per month	110
Number remaining in hospital June 30, 1902	101
Total number of days' treatment afforded	43,649
Average number of days' treatment per patient	31
Average number of patients treated per day	120
Longest term of treatment (days)	365
Shortest term of treatment (day)	1
Number of patients in hospital during the whole year	9

ARMY MEDICAL MUSEUM.

The total number of specimens in the Army Medical Museum at the end of the fiscal year, June 30, 1902, was 35,516. The following statement shows, in detail, the additions and changes in the different sections:

Pathological section:	
In museum June 30, 1901	12,153
Discarded	2
	12,151
Transferred from provisional pathological section	4
Received during the year	287
In museum June 30, 1902	12,442
Anatomical section:	
In museum June 30, 1901	1,552
Discarded	1
	1,551
Received during the year	82
In museum June 30, 1902	1,633

Section of comparative anatomy:		
In museum June 30, 1901		1,432
Discarded		2
In museum June 30, 1902		1,430
Microscopical section:		
In museum June 30, 1901		12,891
Added during the year		25
In museum June 30, 1902		12,916
Miscellaneous section:		
In museum June 30, 1901		2,534
Received during the year		71
In museum June 30, 1902		2,605
Provisional pathological section:		
In museum June 30, 1901		1,326
Discarded	20	
Transferred to pathological section	4	
Donated to physicians	30	
		54
In museum June 30, 1902		1,272
Provisional anatomical section:		
In museum June 30, 1901		678
Donated to physicians		19
In museum June 30, 1902		659
Photographic series:		
In museum June 30, 1901		2,422
Returned to contributor		4
		2,418
Received during the year		141
In museum June 30, 1902		2,559

RECAPITULATION.

Specimens in museum June 30, 1901	34,988
Discarded, donated, and returned to contributor	78
	34,910
Added during the year	606
Specimens in museum June 30, 1902	35,516

The following are some of the more interesting specimens added to the museum collection during the past fiscal year:

EMBRYOLOGY.

3815 (anat. ser.). Twenty-two models showing cleavage of ovum and formation of gastrula.
3816, 3817 (anat. ser.). Two models showing development of human embryo.
3919, 3920 (anat. ser.). Two models showing development of human skull.
3830–3838 (anat. ser.). Nine models showing development of vertebrate eye.
3821–3828 (anat. ser.). Eight models showing development of urogenital apparatus and perineum.

ANOMALIES, DISEASES AND INJURIES.

3840 (anat. ser.). A scapho-cephalic human skull, with metopic suture.
12294 (path. ser.). Prehistoric human bones from a grave in France. Donated by Dr. C. V. Du Bouchet, Paris, France.
12396–12399 (path. ser.). Three specimens of healed fractures of long bones and one of arthritis deformans of hip joint, from an Indian mound in Florida. Donated by C. B. Moore, Philadelphia, Pa.
12335 (path. ser.). Exfoliation of cuticle from use of quinine. Presented by Dr. E. W. Reisinger, Washington, D. C.
12388 (path. ser.). Fatal gangrene in acute pemphigus in a child. Contributed by Dr. S. S. Adams, Washington, D. C.
12400–12449 (path. ser.). Fifty models illustrating the rarer forms of diseases of the skin. Made by Baretta, Paris.
12365, 12366 (path. ser.). Two cases of cerebral hemorrhage, and one of cerebral meningitis, which affected only the convexity, and was due to diplococcus lanceolatus. Contributed by Dr. D. S. Lamb, Washington, D. C.
12326 (path. ser.). Tubercular tumor of cerebellum in a child with general tuberculosis. Contributed by Dr. G. N. Acker, Washington, D. C.
12369 (path. ser.). Hydrocephalic dilatation of back part of brain of child. Contributed by Dr. D. S. Lamb, Washington, D. C.
12376 (path. ser.). Congenital stenosis of pulmonary artery in a child. Contributed by Dr. D. S. Lamb, Washington, D. C.
12309 (path. ser.). A case of stab wound of heart in which the wound was sutured; patient died. Contributed by Dr. G. T. Vaughan, U. S. M. H. S.
12313 (path. ser.). A case of fatal shot wound of heart. Contributed by Asst. Surg. W. P. Chamberlain, U. S. Army.
12373 (path. ser.). Aneurism of abdominal aorta; death from rupture. Contributed by Dr. G. N. Acker, Washington, D. C.
12332 (path. ser.). Excision of varicose veins; recovery and return to duty. Contributed by Surg. C. F. Mason, U. S. Army.
12380 (path. ser.). Rupture of spleen from a kick; splenectomy; death. Contributed by Dr. E. A. Balloch, Washington, D. C.
12273 (path. ser.). Leukemic spleen removed from a woman, aged 40; death. Contributed by Dr. W. A. Warfield, Washington, D. C.
12390 (path. ser.). Rupture of adrenals with hemorrhage; unilateral hydronephrosis in a child; sudden illness and death. Contributed by Dr. J. Ford Thompson, Washington, D. C.
12383 (path. ser.). Tongue removed for carcinoma; death. Contributed by Dr. E. A. Balloch, Washington, D. C.
12325 (path. ser.). Stricture of œsophagus from drinking lye; artificial gastric fistula; death one year afterward. In a child. Contributed by Dr. J. Ford Thompson, Washington, D. C.
12375 (path. ser.). Primary sarcoma of omentum; woman, aged 55. Contributed by Dr. J. Preston Miller, Washington, D. C.
12385 (path. ser.). Fatal volvulus; man, aged 35. Contributed by Dr. G. T. Vaughan, U. S. M. H. S.
12334 (path. ser.). Sudden fatal hæmatemesis in cancer of stomach; man, aged 70. Contributed by Dr. T. C. Smith, Washington, D. C.
12272 (path. ser.). Perforating ulcer of duodenum; fatal peritonitis; man, aged 38. Contributed by Asst. Surg. G. M. Wells, U. S. Army.
12377 (path. ser.). Typhoid lesions of ileum, limited to the last 2 feet; perforation; fatal. Contributed by Asst. Surg. J. H. Ford, U. S. Army.
12337, 12338 (path. ser.). Two cases of fatal subcapsular hemorrhage in the new born. Contributed by Drs. W. C. Woodward and D. S. Lamb, Washington, D. C.
12391 (path. ser.). Cancer of liver. Contributed by Dr. D. C. Huffman, Dayton, Ohio.
12392 (path. ser.). Large biliary cysts of liver. Contributed by Dr. H. L. E. Johnson, Washington, D. C.
12305 (path. ser.). Primary carcinoma of lungs. Contributed by Dr. C. W. Franzoni, Washington, D. C.
12329 (path. ser.). Pneumonia, with endocarditis of right side. Contributed by Dr. D. S. Lamb, Washington, D. C.
12314 (path. ser.). Encysted bullet. Contributed by Dr. J. Ford Thompson, Washington, D. C.
12330, 12331 (path. ser.). Two cases of fatal shot fractures of thoracic vertebræ. Contributed by Surg. William Stephenson, U. S. Army.

12386, 12387 (path. ser.). Two amputations for sarcoma of bone—one of the femur and the other of the fibula. Contributed by Drs. G. T. Vaughn, U. S. M. H. S., and V. B. Jackson, Washington, D. C.

12298 (path. ser.). Model of the mouth of the dwarf "Prince Tinymite." Contributed by Dr. W. H. Steeves, Frederickton, New Brunswick.

12282 (path. ser.). A soft gold filling 52 years old. Contributed by Dr. C. W. Barnes, Porto Alegre, Brazil.

Specimens showing anomalies of the roots of teeth; germinate teeth; supernumary teeth; impacted teeth; enamel nodules; odontoma; hypercementosis; misplacement of teeth; erosion of teeth; obliteration of pulp cavity; wear; tartar; absence of teeth; caries; narrow dental arch; abnormal depression of palate; nonocclusion of teeth; abnormalities of gums; crown work. Donated by Drs. W. C. Achard, Zurich, Switzerland; F. E. Buck, Jacksonville, Fla.; T. T. Fauntleroy, Staunton, Va.; A. H. Fuller, St. Louis, Mo.; J. M. Henriques, Buenos Ayres; T. S. Hitchcock, Oswego, N. Y.; E. W. Murlless, Sidney, Nebr.; Z. I. Nutt, Washington, D. C.; F. B. Oliver, Hammond, Ind.; J. T. Orozeo, San Salvador, C. A.; H. W. Parsons, Wamego, Kans.; M. C. Smith, Lynn, Mass.; T. Siqveland, Brooklyn, N. Y.; T. C. Triggert, St. Thomas, Canada.

12283, 12284 (path. ser.). Native artificial dentures from Ceylon. Contributed by Dr. N. M. Caina, Colombo, Ceylon.

12295–12297 (path. ser.). Artificial dentures of hippopotamus ivory. Contributed by Dr. C. V. Du Bouchet, Paris, France.

Forty-three wax models, showing smallpox in progressive stages, chicken pox, and vaccination. Made by B. E. Dahlgren, Philadelphia, Pa.

12395 (path. ser.). Suprapubic lithotomy; man, aged 72; recovery. Contributed by Dr. B. G. Pool, Washington, D. C.

12384 (path. ser.). Prostatectomy for hypertrophy; man, aged 60; death. Contributed by Dr. E. A. Balloch, Washington, D. C.

12382 (path. ser.). Epithelioma of penis; amputation; recovery. Contributed by Surg. W. D. Crosby, U. S. Army.

12394 (path. ser.). Tuberculosis of uterus and tubes; girl of 12. General tuberculosis. Contributed by Dr. J. Ford Thompson, Washington, D. C.

LIBRARY OF THE SURGEON-GENERAL'S OFFICE.

The following table shows the additions made to the library during the fiscal year 1901–2:

Description.	On hand June 30, 1901.	Added during fiscal year.	Total June 30, 1902.
	Volumes.	*Volumes.*	*Volumes.*
Medical journals	41,881	1,394	43,275
Medical transactions	6,659	313	6,972
Bound theses	2,134	20	2,154
Bound pamphlets	2,805	61	2,866
Other medical books	87,060	2,473	89,533
Total	140,539	4,261	144,800
Medical theses	63,637	1,386	65,023
Medical pamphlets	172,834	7,144	179,978
Total	236,471	8,530	245,001

Of the total number of theses on hand June 30, 1901, there were 257 bound in 20 volumes during the year.

There were presented to the library during the year 636 books and 9,542 pamphlets and journals.

Volume VII, second series, of the Index Catalogue includes the letters H and I, from "Hernia" to "Inquiry," and forms a volume of 1,003 pages. It will be ready for distribution at the usual time. The

appropriation for Volume VIII, second series, having been made, the manuscript is in course of preparation for the printer.

HOSPITAL CONSTRUCTION AND REPAIR.

During the past fiscal year modern hospitals were completed at Fort Robinson, Nebr.; Fort Mason, Cal.; Fort Getty, S. C., and Fort Leavenworth, Kans. The hospital at the latter post was paid for from a special appropriation of $60,000 authorized by Congress and is equipped with all modern appliances, thus forming a general model for large military posts.

Additions to the hospitals at Forts Hancock, N. J.; Screven, Ga., and Morgan, Ala., have been completed. Temporary buildings were erected at Fort Riley, Kans., to increase the hospital accommodations, and Congress was asked for a special appropriation of $100,000 to erect a modern hospital for 100 beds at this post.

A mortuary was erected for use in connection with the hospital at Fort Screven, Ga., and plans have been prepared for new hospitals to be erected at Fort Miley, Cal.; Fort Banks, Mass., and Fort Greble, R. I. Plans have also been prepared for additions to the hospitals at Fort Robinson, Nebr.; Fort Meade, S. Dak.; Fort Snelling, Minn.; Fort Wadsworth, N. Y.; Fort Hunt, Va.; Fort Washington, Md., and Fort Hancock, N. J. Some of these hospital buildings and additions are in course of erection and others are being figured on in the market.

Repairs and improvements have been made to all hospitals requiring them in the United States; also to the hospitals in Porto Rico and the Philippine Islands.

MEDICAL OFFICERS, UNITED STATES ARMY.

The number of medical officers allowed by the act approved February 2, 1901, is 321. The number in service on June 30, 1901, was 272, leaving on that date 49 vacancies to be filled. During the fiscal year ended June 30, 1902, the following changes occurred in the personnel:

Appointments.—First lieutenants, assistant surgeons, 39.

Promotions.—One colonel, assistant surgeon-general, to be brigadier-general, Surgeon-General; 5 lieutenant-colonels, deputy surgeons-general, to be colonels, assistant surgeons-general; 7 majors, surgeons, to be lieutenant-colonels, deputy surgeons-general; 8 captains, assistant surgeons, to be majors, surgeons; and 5 lieutenants, assistant surgeons, to be captains, assistant surgeons.

Resignations.—Two first lieutenants, assistant surgeons.

Retirements.—One brigadier-general, Surgeon-General; 1 colonel, assistant surgeon-general, and 2 lieutenant-colonels, deputy surgeons-general, all by operation of law, together with 1 colonel, assistant surgeon-general, at his own request after forty years of service; 1 colonel, assistant surgeon-general; 1 major, surgeon; and 1 lieutenant, assistant surgeon, on account of disability.

Wholly retired.—One lieutenant, assistant surgeon.

Died.—One colonel, assistant surgeon-general.

Army medical boards for the examination of candidates for appointment in the Medical Corps of the Army have continued in session during portions of the fiscal year in Washington, D. C., San Francisco,

Cal., and Manila, P. I. The following is a summary of the work performed by each board:

Board at Washington, D. C.—		
Number of candidates invited to appear		202
Declined to appear	17	
Failed to appear	38	
		55
Number of candidates examined		147
Approved		28
Physically disqualified		46
Rejected		39
Withdrew		34
Board at San Francisco, Cal.—		
Number of candidates invited to appear		17
Failed to appear		4
Number of candidates examined		13
Approved		4
Physically disqualified		3
Withdrew		6
Board at Manila, P. I.—		
Number of candidates examined		32
Approved		8
Physically disqualified		6
Rejected		8
Withdrew		10

Of 192 candidates examined by these boards 55 were rejected as disqualified physically, 97 withdrew in the progress of the examination or were rejected on its conclusion, and 40 were approved and recommended for appointment.

The candidates appearing before the board in Washington consisted almost entirely of young medical graduates, very few having been in service as volunteer officers or contract surgeons. It is quite gratifying to note that while the standard of examination has been maintained the percentage of those approved has increased during the year ended June 30, 1902, to 19.05 per cent from 16.67 per cent during the previous fiscal year. A large proportion of the candidates examined by the board in San Francisco had been or were at the time in service as medical officers, and all of those who came before the board at Manila were in service at the time of examination. As those in service had been required to pass a more or less rigid examination before appointment, the percentage of those approved is naturally somewhat higher than among the candidates appearing before the board in Washington.

THE ARMY MEDICAL SCHOOL.

The fifth and last session of the army medical school began November 4, 1901, and ended April 4, 1902, with a class of 23 students, all of whom were young assistant surgeons recently appointed in the Medical Corps of the Regular Army.

During the three years that have elapsed since the close of its fourth session in 1898, the operations of the school have been suspended

owing to the exigencies of the service, and some changes have occurred in the personnel of the faculty, as shown in Special Orders, No. 140, Headquarters of the Army, June 17, 1901, paragraph 12; Special Orders, No. 238, October 16, 1901, paragraph 27, and Special Orders, No. 255, November 4, 1901, paragraph 19.

The personnel of the faculty during the fifth session of the school was as follows:

Col. William H. Forwood, assistant surgeon-general, U. S. Army, president of the school.

Col. Charles Smart, assistant surgeon-general, U. S. Army, professor of military hygiene and director of the chemical laboratory.

Col. Calvin De Witt, assistant surgeon-general, U. S. Army, professor of military medicine.

Lieut. Col. J. Van R. Hoff, deputy surgeon-general, U. S. Army, lecturer on the duties of medical officers in war and peace.

Maj. Walter Reed, surgeon, U. S. Army, professor of clinical and sanitary microscopy, and director of the pathological laboratory.

Maj. L. A. La Garde, surgeon, U. S. Army, lecturer on gunshot injuries. (Auxiliary course in clinical optometry.)

Maj. William C. Borden, surgeon, U. S. Army, professor of military surgery, demonstrator in operations on the cadaver and surgical clinics.

Capt. F. P. Reynolds, assistant surgeon, U. S. Army, instructor in hospital-corps drill and first aid to the wounded.

Capt. E. L. Munson, assistant surgeon, U. S. Army, assistant to the professor of hygiene.

The following auxiliary lectures were given by courtesy, at the invitation of the Surgeon-General, for which the thanks of the faculty and the student officers are hereby most cordially tendered:

By Brig. Gen. George B. Davis, Judge-Advocate-General of the Army, on medical jurisprudence, military law, and courts-martial.

By Prof. C. W. Stiles, Ph. D., Agricultural Department, Bureau of Animal Industry, on parasites in man.

By Dr. Robert Fletcher, F. R. C. S., England, assistant librarian, on the great library of the Surgeon-General's Office and its uses.

The hours of instruction were daily, except Saturdays, Sundays, and holidays, from 9 to 12 a. m. and 1 to 4 p. m. On Saturdays, from 9 to 12, instruction in first aid, hospital corps drill, and equitation at Washington Barracks and clinical surgery at the general hospital.

Meetings of the faculty were held regularly for the consideration of business pertaining to the school, but no resolution involving any change in the course of instruction or expenditure for material, except a few small items in connection with the graduating exercises, was adopted.

Examinations began March 22, 1902, and continued daily to include April 2, 1902, and after due consideration by the faculty the relative proficiency of the student officers in each branch was determined.

The general deportment of the student officers was most exemplary throughout the five months' course. They devoted themselves diligently and attentively to the duties of the school and worked with zeal and energy to improve the splendid opportunity offered and joined heartily in the competitive struggle for graduating honors.

"The Alexander H. Hoff memorial gold medal," founded by Lieut. Col. John Van R. Hoff, in memory of his father, a former member of

the corps, was offered to the student who should receive the highest average markings at final examination, and in this instance was awarded to First Lieut. and Asst. Surg. James M. Phalen, U. S. Army.

It was reserved for those who should attain a standing of not less than 90 per cent in the total markings to receive the distinction of "honor graduate," and this was gained by three members of the class in addition to the winner of the medal—Lieutenants Roerper, O'Connor, and Patterson. These honorary inducements held out as an incentive to competitive effort produced a marked effect in arousing the energy, holding the attention, and maintaining the interest of the class in a good-natured rivalry for preferment, which prevailed from the beginning to the end of the session.

An average of 70 per cent was fixed as the minimum for graduation with a diploma, and this was attained by all, as will be seen by reference to the table of markings, where the relative standing of each student is given.

The graduating exercises were held in the hall of the National Museum, at 3 p. m. on April 4, and I desire to express the thanks of the faculty and the student officers to Secretary Langley and the Board of Regents for their courtesy in extending to us the privileges of the hall for that occasion, and also to the commanding officer of the Engineer Battalion, Washington Barracks, who kindly sent us the band which furnished excellent music to enliven the proceedings.

The diplomas were presented with some eloquent and appropriate remarks by the honorable Secretary of War and the memorial medal by its founder, after which an address of much force and permanent value was delivered to the class by Surgeon-General Sternberg, and, finally, the Lieutenant-General of the Army made an able and earnest appeal to the student officers of an advisory character as to their future career in the military service.

MEDICAL OFFICERS, VOLUNTEERS.

The act of February 2, 1901, reorganizing the Army, authorized the appointment of 50 surgeons of volunteers with the rank of major, and 150 assistant surgeons of volunteers with the rank of captain, all for service in the Division of the Philippines. On June 30, 1901, the full complement authorized by law was in commission. During the year ended June 30, 1902, 9 majors, surgeons, were discharged from service, 1 died, and 1 was killed in action, making a loss of 11 majors, surgeons, which was repaired by the appointment of 2 majors, surgeons, and the promotion of 9 captains, assistant surgeons. The loss among the captains, assistant surgeons, during the year consisted of 22 discharged from the service, 1 died, and 9 promoted, making a total of 32 replaced by new appointments, leaving in service June 30, 1902, the full complement of 50 majors, surgeons, and 150 captains, assistant surgeons, allowed by law.

CONTRACT SURGEONS, UNITED STATES ARMY.

There were in service June 30, 1901, 387 contract surgeons. During the year ended June 30, 1902, contracts were made with 60 physicians; 172 contracts were annulled and 2 terminated by death, leaving 273 under contract. No contracts are now being made and a gradual

SURGICAL CLINIC FOR STUDENT OFFICERS, ARMY MEDICAL SCHOOL, WASHINGTON, D. C.

reduction in the number of these surgeons is being effected by natural causes.

The two who died during the fiscal year were: Conn R. Ohliger, August 20, 1901, drowned in the Island of Samar; Guy S. Dean, September 15, 1901, pulmonary tuberculosis, at Santa Mesa Hospital, Manila, P. I. The following tabulation shows the number of contracts made with physicians from April 17, 1898, to December 31, 1901, classified by length of service; also, the number serving each year:

Length of service.	Dec. 31, 1901.		
	Not in service.	In service.	Total.
Under 1 month	36	1	37
1 to 6 months	350	2	352
6 to 12 months	176	33	209
1 to 2 years	240	144	384
2 to 3 years	153	36	189
Over 3 years	21	57	78
Total	976	273	1,249

Year.	Whole number in service.	Average number in service.
1898	763	343
1899	674	416
1900	657	482
1901	594	394

Average service of the 976 out of service, 12 months 11 days.
Average service of the 273 in service, 23 months 5 days.
Average service of the 1,249 contract surgeons, 14 months 22 days.

CONTRACT DENTAL SURGEONS.

The organization of the Corps of Dental Surgeons authorized by the army reorganization bill approved February 2, 1901, is still in progress. On December 31, 1901, the corps was composed of 28 appointees. Of this number, 3, employed as examining and supervision dental surgeons, constituted the board of examiners for this service. Twenty candidates had passed the examinations of the board of examiners and 5 were appointed from the Army under the provisions of the act without examination by the board.

The report of the examining board shows that up to December 31, 1901, 87 candidates had been invited from the various States and Territories to take the examination. Six of these declined to appear, 10 accepted the invitation but failed to report, and 71 reported for examination. Of the 71 who reported for examination, 20 were found qualified and approved, 8 were physically disqualified, 3 failed in both the theoretical and practical examinations, 7 failed in the theoretical examinations, and 33 withdrew before completion of the theoretical examinations. Of the 43 who failed or withdrew, 15 requested and were accorded a second examination, 5 of whom passed. The number of candidates who passed upon their first examination was 15, those who passed upon the second examination were 5. Of the 28 dental surgeons appointed, 1 was assigned to duty in the Department of Cuba, 1 to the island of Porto Rico, 17 to the Division of the Philippines, and 9 to stations in the United States. The following tabulation shows

the distribution of the dental surgeons and the date of arrival at their first stations:

	United States.	Philippines.	Cuba.	Porto Rico.	Total.
1901.					
February	3				3
March					
April		2			2
May					
June		6			6
July	2	3	1		6
August	4	3		1	8
September		2			2
October		1			1
November					
December					
Total	9	17	1	1	28

Upon the adjournment of the examining board, which held continuous sessions at Washington, D. C., from February 18 to July 31, 1901, the members of the board were assigned to duty, one to the Department of Cuba, one to the Division of the Philippines, and one to the Department of California.

To facilitate the work of the corps each dental surgeon is provided with at least one assistant, who is detailed from the privates or acting stewards of the Hospital Corps. In some instances, as at the United States Army general hospital, Presidio of San Francisco, Cal., where the amount of dental service required is very great, extra details were made from the Hospital Corps of such men as showed aptitude for or had had experience in this line of work before entering the Army.

The energies and resources of the Dental Corps have been taxed to their fullest extent in caring for those officers and enlisted men who have sought their services for the relief of suffering, and this has made it necessary in some instances for the dental surgeons to operate daily from 8 a. m. to 5 or 6 p. m. The great amount of service that has been rendered by the dental surgeons could not have been accomplished but for these long hours of work and the assistance accorded them through the extra details of members of the Hospital Corps.

The whole number of patients, regulars and volunteers, that have been treated during the period covered by the reports of dental surgeons in this office are 9,148.

	Regulars.	Volunteers.
United States	2,872	7
Philippine Islands	5,174	16
Cuba and Porto Rico	1,079	
Total	9,125	23

The reports from the Philippine Islands were still incomplete when this résumé was prepared, some stations being two and three months behind, and as a consequence it does not show the actual amount of service rendered by the dental surgeons in the Philippine Division.

The services of the dental corps, however, made a highly creditable showing when the facts are taken into consideration that the corps was not fully organized at the close of the year; that much delay was experienced in transporting them to their first stations and equipping

them for service. The reports in this office cover the period from June 1 to December 31, 1901, but a reference to the table of distribution of dental surgeons and date of arrival at first station will show that active work did not begin in the United States, Cuba, and Porto Rico until July and August, while in the Philippine Islands, although several dental surgeons reported for duty in Manila in June and July, active work was delayed until a still later period on account of the difficulties experienced in transporting supplies over so great a distance and the obstacles which always surround the launching of a new enterprise or a new line of service.

The character of the service so far rendered by the dental surgeons has, by reason of the great number of patients who have applied for treatment, been largely of an emergency nature, and the constant effort has been made to so treat the cases as to return the men to duty with the least possible delay and loss to the service.

The tabulations of diseases and injuries of the mouth and jaws, of the teeth and gums, and of operations and treatment which follow, show that a large part of the time and skill of the dental surgeons was expended in giving relief from the suffering caused by dental caries, pulpitis, pericementitis, alveolar abscess, pyorrhea alveolaris, and gingivitis. The comparatively large number of teeth extractions is due to the great prevalence of dental caries of a severe type among the enlisted men who are serving or have served in Cuba, Porto Rico, or the Philippines. Instructions were issued to the dental surgeons to conserve as far as possible all teeth that could be placed in a healthy condition by appropriate treatment, so as to reduce the loss of teeth to the minimum, and these instructions have been generally carried out.

It seems to be an established fact than dental caries takes on more active symptoms among our troops after a few months' residence in a tropical climate, but whether this is due to neglect of a proper hygienic care of the teeth during active campaigning or to the depressing effect of a tropical climate upon assimilation and vital resistance in individuals going from a temperate zone, or to the necessary changes in the character of the food, remains to be demonstrated. It would seem more than probable, however, that it is due to the effects of all these conditions combined.

A reference to the statistical tables will also show that pyorrhea alveolaris and inflammatory and ulcerative conditions of the gums and oral mucus membrane are very prevalent among the officers and enlisted men who have served or are serving in the tropics. These conditions are more noticeable in those who have been in the Philippines for a considerable period and in those who have suffered from certain forms of illness. These conditions seem to be largely due in the former to the enervating and debilitating effects of the hot climate, etc., and in the latter to such wasting diseases as gastritis, diarrhea, dysentery, and the continued fevers.

Total number of treatments and operations, medical, surgical, and mechanical:

	Regulars.	Volunteers.
United States	4,766	33
Philippine Islands	6,959	49
Cuba and Porto Rico	1,691	
Total	13,416	82

REGULARS.

Diseases and injuries of the teeth and gums.

	United States.	Philippine Islands.	Cuba and Porto Rico.	Total.
Abrasions, mechanical	1	25	2	28
Abscess of the jaws associated with impacted teeth	.....	48	.....	48
Calcification of the pulp	.....	4	.....	4
Caries	3,911	3,018	1,479	8,408
Cysts of the jaws associated with devitalized teeth	.....	4	.....	4
Dento-alveolar abscess	353	354	60	767
Defective fillings	.....	25	.....	25
Erosion, chemical	1	1	.....	2
Fracture of the teeth	30	1	2	33
Hemorrhage following extraction	.....	3	.....	3
Hypertrophy of the gums	.....	96	8	104
Hypertrophy of the pulp	.....	1	.....	1
Hypercementosis	1	29	1	31
Impacted teeth	23	.....	5	28
Irregularities of the teeth	10	.....	.....	10
Necrosis of the teeth	9	48	1	58
Pericementitis, acute	69	182	103	354
Pericementitis, chronic	2	72	5	79
Pulp nodules	2	.....	.....	2
Pulpitis, acute	398	356	109	863
Pulpitis, chronic	119	137	6	262
Pyorrhea alveolaris	84	427	10	521
Resorption of the alveolar process	1	91	3	95
Recession of the gums	.....	2	.....	2
Salivary deposits	322	719	108	1,149
Supernumerary teeth	10	.....	.....	10
Total	5,346	5,643	1,902	12,891

Diseases and injuries of the mouth and jaws.

Arthritis, tempo-maxillary articulation	1	.....	.....	1
Fracture of the alveolar process	1	.....	1	2
Fracture of the jaws	6	.....	.....	6
Gingivitis, simple	59	178	14	251
Gingivitis, ulcerative	18	20	.....	38
Necrosis of the jaws	2	73	.....	75
Neuralgia, facial	4	.....	.....	4
Periostitis	6	.....	4	10
Stomatitis, simple	9	11	.....	20
Stomatitis, ulcerative	.....	7	.....	7
Stomatitis, ulcerative, syphilitic	1	.....	.....	1
Tumors of the gums	1	1	1	3
Total	108	290	20	418

Operations upon the teeth and jaws.

Abscesses lanced	24	35	27	86
Salivary deposits removed	336	682	111	1,129
Pulp capped	14	19	3	36
Pulp devitalized	447	264	41	752
Pulp extirpated	148	166	25	339
Root canals filled with gutta-percha	228	257	32	517
Teeth extracted	534	1,260	278	2,072
Teeth treated, medicated	521	515	170	1,206
Excision of gums	5	.....	3	8
Total	2,257	3,198	690	6,145

Restorations by fillings.

	United States.	Philippine Islands.	Cuba and Porto Rico	Total.
Amalgam	1,613	1,865	601	4,079
Gold	581	498	219	1,098
Gutta-percha	40	451	33	524
Oxyphosphate	223	852	58	1,133
Tin		2		2
Restorations by combination fillings.				
Gutta-percha and oxyphosphate	12		25	37
Gutta-percha and amalgam	45		2	47
Oxyphosphate and amalgam	104		11	115
Total	2,418	3,668	949	7,035

Restorations by crowns and bridges.

Bridges:				
Gold and porcelain	18	27	9	54
Gold	5	17	9	31
Reset	5	5	3	13
Crowns:				
Logan	8	19	11	38
Gold shell	34	18	15	67
Richmond	4	7		11
Reset	6		2	8
Total	80	93	49	222

Restorations by artificial dentures.

Dentures:				
Vulcanite, partial	8		2	10
Vulcanite, full	1			1
Broken plate repaired			1	1
Total	9		3	12

Mechanical appliances for fractured jaws.

Angle appliance	1			1
Kingsley splint, vulcanite	1			1
Total	2			2

VOLUNTEERS.

Diseases and injuries of the teeth and gums.

	United States.	Philippine Islands.	Total.
Caries	5	22	27
Percementitis, acute	1		1
Pulpitis, acute	7		7
Pulpitis, chronic	1		1
Salivary deposits	1		1
Defective fillings		2	2
Supernumerary teeth		3	3
Total	15	27	42

Diseases and injuries of the mouth and jaws.

	United States.	Philippine Islands.	Total.
Gingivitis, simple	1		1

Operations upon the teeth and jaws.

Salivary deposits removed	1		1
Pulp devitalized	3	3	6
Pulp extirpated	2		2
Teeth treated, medicated	7	10	17
Root canals filled with gutta-percha		3	3
Total	14	16	30

Restorations by fillings.

Amalgam	4	5	9
Gold		5	5
Oxyphosphate		1	1
Total	4	11	15

NOTE.—The only volunteers remaining in the service after June 30, 1901, were volunteer medical officers.

The following tables, compiled from 8,408 cases of dental caries treated by filling or extraction, shows the susceptibility of the individual teeth to this disease in the troops stationed in the United States, the Philippine Islands, Cuba, and Porto Rico:

Table of susceptibility to dental caries of individual teeth of troops in the United States.

Classification.		Caries.			Percentage.		
		Right.	Left.	Total	Right.	Left.	Total.
Central incisors	upper	145	134	279	7.52	6.75	7.05
	lower	7	7	14	.36	.35	.35
Lateral incisors	upper	106	122	228	5.50	6.14	5.82
	lower	12	9	21	.62	.45	.53
Cuspids	upper	40	57	97	2.07	2.87	2.45
	lower	9	9	18	.46	.45	.43
First bicuspids	upper	164	172	336	8.51	8.66	8.59
	lower	40	25	65	2.07	1.25	1.66
Second bicuspids	upper	196	189	385	10.16	9.52	9.84
	lower	101	111	212	5.23	5.59	5.42
First molars	upper	332	327	659	17.22	16.48	16.84
	lower	276	256	532	14.32	12.90	14.11
Second molars	upper	182	193	375	9.44	9.72	9.58
	lower	199	255	454	10.32	12.85	11.60
Third molars	upper	55	45	100	2.85	2.26	2.55
	lower	63	73	136	3.26	3.67	3.47
Total		1,927	1,984	3,911			

SUMMARY.

	Number.	Per cent.
Upper	2,458	62.89
Lower	1,453	37.12
	3,911	
Right	1,927	49.27
Left	1,984	50.72
	3,911	

Table of susceptibility to dental caries of individual teeth of troops in the Philippine Islands.

Classification.		Caries.			Percentage.		
		Right.	Left.	Total.	Right.	Left.	Total.
Central incisors	upper	117	86	203	7.31	6.06	6.72
	lower	69	61	130	4.31	4.30	4.30
Lateral incisors	upper	77	77	154	4.81	5.43	5.10
	lower	60	45	105	3.75	3.17	3.47
Cuspids	upper	86	56	142	5.37	3.94	4.70
	lower	69	52	121	4.31	3.66	4.00
First bicuspids	upper	72	66	138	4.50	4.65	4.57
	lower	41	29	70	2.56	2.04	2.31
Second bicuspids	upper	85	106	191	5.31	7.47	6.32
	lower	39	66	105	2.43	7.40	3.47
First molars	upper	166	127	293	10.37	8.96	9.70
	lower	271	248	519	16.93	17.48	17.19
Second molars	upper	146	130	276	9.12	9.16	9.14
	lower	123	130	253	7.68	9.16	8.38
Third molars	upper	45	30	75	2.81	2.11	2.48
	lower	134	109	243	8.37	7.68	8.05
Total		1,600	1,418	3,018			

SUMMARY.

	Number.	Per cent.
Upper	1,472	48.80
Lower	1,546	51.22
	3,018	
Right	1,600	53.01
Left	1,418	46.98
	3,018	

Table of susceptibility to dental caries of individual teeth of troops in Cuba and Porto Rico.

Classification.		Caries.			Percentage.		
		Right.	Left.	Total.	Right.	Left.	Total.
Central incisors	upper	78	89	167	10.01	12.71	11.29
	lower	4	5	9	.51	.70	.60
Lateral incisors	upper	71	52	123	9.11	7.42	8.31
	lower	3	3	6	.38	.42	.40
Cuspids	upper	24	31	55	3.08	4.42	3.71
	lower	3	4	7	.38	.57	.47
First bicuspids	upper	67	59	126	8.60	8.42	8.51
	lower	24	16	40	3.08	2.28	2.70
Second bicuspids	upper	61	42	103	7.83	6.00	6.96
	lower	42	28	70	5.39	4.00	4.72
First molars	upper	99	68	167	12.70	9.70	11.29
	lower	73	70	143	9.88	10.00	9.66
Second molars	upper	66	85	151	8.47	12.14	10.20
	lower	90	81	171	11.55	11.57	11.59
Third molars	upper	27	20	47	3.46	2.85	3.17
	lower	47	47	94	6.03	6.71	6.35
Total		779	700	1,479			

SUMMARY.

	Number.	Per cent.
Upper	939	63.48
Lower	540	36.51
	1,479	
Right	779	52.66
Left	700	47.32
	1,479	

Summary of tables of susceptibility to dental caries in individual teeth of the United States Army as a whole.

Classification.		United States.		Philippine Islands.		Cuba and Porto Rico.		Total.	
		Caries.	Per cent.	Caries.	Per cent.	Caries.	Per cent.	Caries.	Per cent.
Central incisors	upper	279	7.05	203	6.72	167	11.29	649	7.71
	lower	14	.35	130	4.30	9	.60	153	1.81
Lateral incisors	upper	228	5.82	154	5.10	123	8.31	505	6.00
	lower	21	.53	105	3.47	6	.40	132	1.56
Cuspids	upper	97	2.45	142	4.70	55	3.71	294	3.49
	lower	18	.43	121	4.00	7	.47	146	1.73
First bicuspids	upper	336	8.59	138	4.57	126	8.51	600	7.13
	lower	65	1.66	70	2.31	40	2.70	175	2.08
Second bicuspids	upper	385	9.84	191	6.32	103	6.96	679	8.07
	lower	212	5.42	105	3.47	70	4.72	387	4.60
First molars	upper	659	16.84	293	9.70	167	11.29	1,119	13.30
	lower	532	14.11	519	17.19	143	9.66	1,194	14.20
Second molars	upper	375	9.58	276	9.14	151	10.20	802	9.53
	lower	454	11.60	253	8.38	171	11.59	878	10.44
Third molars	upper	100	2.55	75	2.48	47	3.17	222	2.64
	lower	136	3.47	243	8.05	94	6.35	473	5.60
Total		3,911	.....	3,018	.....	1,479	.....	8,408	.....

SUMMARY.

	Number.	Per cent.
Upper	4,870	57.92
Lower	3,538	43.08
	8,408	.....
Right	4,306	51.21
Left	4,102	48.78
	8,408	.....

The percentage of caries is considerably higher for the central and lateral incisors and cuspids, both upper and lower, than is usually given in published statistics, being in some instances more than double. In the bicuspids, upper and lower, the percentage agrees very closely with published statistics, while in the first molars, both upper and lower, it is about 4 per cent less. The latter variation may be accounted for from the fact that the first molars are very frequently lost from caries before the individual reaches the legal age for enlistment. In the second and third molars the variation in the percentage is not very different from published statistics. The comparatively low percentage of dental caries in the bicuspids and the second and third molars may also be accounted for by the fact that it was not a bar to enlistment during the Spanish-American war if the applicant had only two opposing molars, one above and one below, upon opposite sides of the mouth. Many men were therefore enlisted who had already lost the bicuspids and the other molars.

In view of these facts it would seem advisable to raise the requirement of the number of opposing molars that should be possessed by the recruit and that the general condition of all of the teeth should be taken into account before accepting him. Applicants who show signs of extensive dental caries should not be accepted for service, as such men are constantly being carried upon the company sick book on account of incapacity for duty resulting from dental diseases or have to be discharged on account of their inability to properly masticate the army ration.

The services of the Dental Corps have been highly appreciated by the officers and enlisted men of the Regular and Volunteer Armies and have proved very satisfactory to the Medical Department, because they have been able to relieve a great amount of acute suffering and to conserve a large number of teeth and restore them to a healthy condition, thus almost immediately returning to duty many cases that were previously carried for several days upon the company sick report. This has resulted in greatly reducing the loss of valuable time to the service, incident to diseases of the mouth, teeth, and jaws, and relieving and hastening the cure of such gastric and intestinal disorders as were due to defective mastication and infective and suppurative conditions of the teeth and oral cavity.

The cost of maintaining the Dental Corps is small when compared with the relief from suffering obtained and the greater efficiency of the officers and men who have received the service of the dental surgeons. Good teeth are an essential factor in maintaining the general health of our troops, and consequently their efficiency, and on account of the increasing prevalence of dental caries and the abnormal condition growing out of the disease the dental surgeon has become a necessity to the Army. Early provision should therefore be made for the establishment of a permanent corps of dental surgeons attached to the Medical Department.

HOSPITAL CORPS.

At the date of last report, June 30, 1901, the total strength of the corps was 4,336 men, viz:

Hospital stewards	246	
Acting hospital stewards	388	
Privates	3,702	
		4,336

Since then it gained, up to June 30, 1902—

By enlistment and reenlistment	1,282	
By transfer from the line	548	
From desertion	18	
		1,848
Total		6,184

And lost during the same period—

By discharge per expiration of service	1,772	
By discharge by order	112	
By discharge by sentence of general court-martial	34	
By discharge on surgeon's certificate of disability	66	
By retransfer to line	17	
By retirement	6	
Killed in action	1	
By death due to disease	32	
By death due to drowning	2	
By death due to suicide	2	
By death due to accident	6	
By desertion	92	
		2,142
Leaving in service June 30, 1902, a total of		4,042

Hospital stewards	271
Acting hospital stewards	405
Privates	3,366
	4,042

Hospital stewards.—The number of hospital stewards allowed by law is 300. Forty-four vacancies existed on June 30, 1901; 15 men were appointed during the past fiscal year, leaving 29 vacancies June 30, 1902, which were filled September 1 as the result of the examination held in May. The reports of the examining boards, together with written examination, were received at this office from the Division of the Philippines August 20, 1902.

The total number of applicants in the Division of the Philippines for the examination for the position of hospital steward held at this time was 42. Two of these were disapproved. Of the 40 approved applicants 2 were discharged prior to examination, 3 reported too late for examination, and 13 withdrew from examination, leaving 22 who were fully examined. Of these 22, 13 were recommended and 9 not recommended for appointment by the local boards. Of the 13 recommended 5 averaged in the written examination between 80 and 90, 7 between 70 and 80, and 1 failed.

Forty-five applications were received from acting hospital stewards serving in the United States, Alaska, and Cuba, 2 acting stewards withdrew, and 4 were not examined, 1 being at sea and 3 in Alaska. Of the 39 examined 8 were not recommended by the local boards, 5 failed to reach the minimum (70 per cent), and 26 made over 70 per cent, 8 over 90 per cent, 11 from 80 to 89, and 7 from 70 to 79 per cent. Of the 8 who made over 90 per cent, 7 have been appointed hospital stewards and 1 is awaiting for a few days completion of his twelve months' service as acting hospital steward, as required by law.

The questions for this examination were prepared in the Surgeon-General's Office, each set inclosed in a separate envelope, carefully sealed with wax, and forwarded to the respective chief surgeons, with directions that the president of each of the different examining boards should retain the envelope in his personal possession, open it only on the day of the examination, and certify that it was received in good condition.

During the year 207 acting hospital stewards have been detailed, 46 by the Surgeon-General and 161 by chief surgeons, the latter as follows:

Department of California	9
Department of the Colorado	1
Department of the Columbia	6
Department of Dakota	3
Department of the East	24
Department of the Missouri	12
Department of Texas	1
Department of the Lakes	7
Department of Cuba	6
Division of the Philippines	92
Total	161

Within certain limitations the number of promotions to the grade of acting hospital steward is an excellent index of the results of the systematic instruction of the Hospital Corps now being carried on throughout the Army. The regulation proportion of one noncommissioned officer to four privates has not yet been attained, but it is believed that in a short period it will be.

In order to increase the efficiency of the Hospital Corps and give the private soldiers the same opportunity as that enjoyed by those of the line, the Surgeon-General recommended in August, 1901, the addition

of a paragraph to the regulations authorizing the appointment of lance acting hospital stewards. This authority was granted in General Orders, No. 139, Adjutant-General's Office, November 2, 1901. This affords an opportunity to test the men as to their qualifications for the position of noncommissioned officers and has worked very well up to the present time. Ninety lance acting hospital stewards have been detailed, of which number 12 were ultimately promoted to the grade of acting hospital steward.

Recruitment.—In September, 1901, the commanding general, Division of the Philippines, reported by cable that no more enlisted men of the Hospital Corps were needed in that division. In consequence thereafter recruiting for the corps was, for a short time, confined to soldiers who had been discharged with excellent character, or to recruits who possessed special qualifications.

In November, nothing further upon this subject being heard from the Division of the Philippines, the Surgeon-General invited the attention of the Adjutant-General to the fact that a large number of discharges by expiration of term of service would occur in the Hospital Corps during the next four months (about 1,275), which would materially reduce the strength of that organization in that division, where most of the men enlisted late in 1898 and early in 1899 had been sent. As it was not believed that any considerable number of these men would reenlist in the Philippines, and as there was no reserve in the United States at the time beyond 200 men at the utmost to replace the above-mentioned losses, it was believed that a very considerable number of men, including noncommissioned officers, would be needed for the Division of the Philippines, the strength of the corps in the division being then 2,500 men.

In view of the fact that recruits for this branch of the service should be given not less than four months' instruction in the rudiments of their work, preferably with a company, it is suggested as important that general recruitment be begun at the earliest possible moment.

In response to the inquiry from the War Department General Chaffee, commanding the Division of the Philippines, on November 12 cabled to the Adjutant-General that with the present number of stations in his division the chief surgeon required 2,400 men of the Hospital Corps and asked that 300 leave the United States December 1, 1901, and 110 each succeeding month for six months. He also stated that he could not fill the vacancies already caused by the departure of men for the United States.

The commanding general, Department of California, was thereupon ordered to resume the transfer of men of the Hospital Corps from the United States to the Philippines, so far as practicable to replace, man for man, the losses in that division, and the Adjutant-General invited the attention of the general recruiting officers to the fact that recruits were now urgently needed for the Hospital Corps, and directed them to report all applicants who were suitable and desired to enter this corps. He advised them that it was not absolutely necessary that applicants should have had previous service in the Army, or preliminary training as druggists, pharmacists, nurses, etc., since any bright, healthy, active young man could be enlisted, provided he had a good common school education and was of good moral character, as evidenced by recommendations. The enlistment of minors for the corps was not desired.

Under these instructions the recruitment has progressed very satis-

factorily during the past year, and much credit is due to the officers of the general recruiting service for the zeal they have displayed in obtaining recruits for the Hospital Corps. A considerable number of enlistments from civil life were also made by chief surgeons to fill vacancies within their departments up to the quota allowed by existing regulations. The authority heretofore granted to chief surgeons to make enlistments without reference to this office and recommend transfers from the line to the Hospital Corps within their departments has worked admirably, saving much clerical labor to this office. It also enabled chief surgeons to meet emergencies immediately, without the former circuitous requisition upon the War Department for additional assistance.

In the Department of the East, for example, there were 154 transfers from the line to the Hospital Corps and 35 enlistments; in that of the Missouri, 20 transfers from the line and 43 enlistments and reenlistments, and in that of Texas, 30 transfers from the line and 5 enlistments. In California 276 men were transferred from the line and 187 were enlisted.

Distribution of the Hospital Corps, United States Army, May 31, 1902, as shown by latest information on file in this office.

	Number of troops.	Hospital stewards.	Acting hospital stewards.	Lance acting hospital stewards.	Privates.	Total.	Per cent Hospital Corps.
California	4,214	24	22	12	269	327	.....
Colorado	2,950	12	5	2	89	108	3.66
Columbia	2,885	13	13	.....	95	121	4.19
Dakota	1,860	8	6	1	56	71	3.81
East	13,019	44	32	2	359	437	3.35
Lakes	2,878	5	13	....	71	89	3.09
Missouri	4,794	10	16	1	131	158	3.28
Texas	2,350	4	6	3	73	86	3.66
Independent	1,750	22	34	2	248	306	.....
Total United States	36,700	142	147	23	1,391	1,703	4.64
Cuba	900	5	4	.....	27	36	4.00
Porto Rico	1,500	3	4	.....	30	37	2.46
Hawaii	230	1	2	.....	18	21	9.13
China	114	1	.....	.....	6	7	6.14
Philippines	47,400	118	210	33	1,762	2,123	4.48
At sea	76	.....	16	.....	73	89	.....
Total	86,920	270	383	56	3,307	4,016	4.62

The number of posts and stations (including United States army transports) was during the last quarter of the fiscal year nearly as follows:

In the United States (including Alaska, Porto Rico, and Hawaii)	156
In Cuba	4
In China	1
In the Philippine Islands	333
Total	494

According to the reports of chief surgeons and inspectors the efficiency, discipline, and instruction of the Hospital Corps are constantly improving, the best evidence of which is the number of noncommissioned officers who have passed the really severe examination required for promotion. The instructional work of the various posts has generally been well done.

Owing to the reduction of the strength of our forces without the

United States and the increase of the home garrisons, causing the reoccupation of abandoned posts, the demands upon the departments to supply men for the Hospital Corps has been great, but were very generally met without calling upon this office for assistance. As a result of these demands it has been found impracticable to always maintain the detachments of instruction at the prescribed strength, or to keep the recruits under instruction long enough to fit them to undertake the practical work of a Hospital Corps man. Nevertheless the requirements have been very well met. It is believed that with the final determination of the strength of the Army and its distribution the detachments of instruction will prove an important adjunct to the medical service in the departments.

The company of instruction at the general hospital, Washington Barracks, has been maintained at the highest state of efficiency, in which connection attention is invited to the following excerpt from a report by its efficient commander, Capt. F. P. Reynolds, assistant surgeon, U. S. Army.

Organization of the Hospital Corps company of instruction, United States Army, general hospital, Washington Barracks, D. C.

NONCOMMISSIONED OFFICERS.

First sergeant	1	Police sergeant	1
Property sergeant	1	Head cook	1
Mess sergeant	1	Instructors and assistant instructors	10
Company clerk	1		
Stable sergeant	1	Total	17

PRIVATES ON SPECIAL DUTY.

Second cook	1	Company clerks	2
Kitchen police	2	Trumpeters	2
Dining-room attendant	1	Mail orderly	1
Diet kitchen police	1	Property attendant	1
Orderlies' room	3	General police	5
Stable police	1		
Ambulance driver	1	Total	22
Night watchman	1		

DUTIES OF NONCOMMISSIONED OFFICERS.

First sergeant.—In general charge.

Property sergeant.—In charge of field and Hospital Corps personal equipment, including medical, quartermaster, and ordnance property. Clothing schedules. Instructor in property accountability.

Mess sergeant.—In charge of the ration and mess, kitchen and mess hall.

Company clerk.—In charge of company office, records, and papers. Instructor in clerical work.

Stable sergeant.—In charge of stable, public animals, and transportation. Instructor in care of animals.

Police sergeant.—In charge of police of buildings and grounds and carpenter shop.

Head cook.—In immediate charge of kitchen.

One instructor.—In charge of class books, instruction rosters, class standing, and other instruction records. In charge of indoor instruction and section rooms. Instructor in first aid.

One instructor.—In charge of outdoor instruction, setting-up drill, Hospital Corps drill, and field work.

Eight instructors and assistant instructors.—Bearer drill, 4; materia medica and pharmacy, 1; nursing and diet cooking, 1; anatomy and physiology, 1; first aid and bandaging, 1.

PERSONAL EQUIPMENT.

1. Clothing list.

Issued to the soldier by the quartermaster on "clothing schedule" and money value charged against soldier's clothing allowance. Clothing thus issued becomes the property of the soldier, but must not be sold.

Loss or damage of clothing by neglect is also a court-martial offense under the seventeenth article of war.

2 blankets.
2 blouses.
1 forage cap.
2 cap ornaments.
4 pair Hospital Corps insignia.
1 canvas coat.
2 summer coats (in summer).
6 collars.
4 pairs drawers.
6 pairs Berlin gloves.
1 campaign hat.
1 hat cord.
1 pair leggins.
1 overcoat.
1 poncho.
2 blue shirts.
3 muslin shirts.
3 undershirts.
1 pair tan shoes.
1 pair black shoes.
6 pairs socks.
1 pair canvas trousers.

1. Clothing list—Continued.

2 pairs blue trousers.
2 pairs summer trousers (in summer).
2 pairs trouser stripes.
1 suit khaki (field uniform).

2. Medical Department property.

1 Hospital Corps pouch.
1 litter sling.
1 Weeks's Nursing.
1 Doty's Prompt Aid.
1 Smart's Handbook.
1 Hospital Corps Drill Regulations.

3. Ordnance property.

1 canteen and strap.
1 haversack and strap.
1 waist belt and plate.
1 meat can.
1 tin cup.
1 knife.
1 fork.
1 spoon.

4. Quartermaster property.

1 shelter-tent half.
2 shelter-tent poles.
5 shelter-tent pins.
1 barrack bag.
4 sheets.
2 pillow cases.

The articles supplied by the Medical, Ordnance, and Quartermaster departments do not become the property of the soldier, but remain Government property.

The soldier is held responsible for the proper use and care of these articles, and in case of loss or damage, due to his own carelessness or neglect, he is required to pay for the loss or damage, and may also be punished by court-martial.

REPORTS, RETURNS, AND RECORDS.

Daily.—Morning report of detachment of the Hospital Corps; sick report. Delinquency report (to company commander). Report of noncommissioned officer in charge of quarters (to company commander). Daily bill of fare of mess (to company commander). Correspondence; letters sent and received. Daily schedule of instruction (to company commander).

Weekly.—Report of detachment of Hospital Corps (to Surgeon-General).

Trimonthly.—Ration returns.

Monthly.—Pay rolls. Examination of recruits. Return of Hospital Corps. Hospital fund account statement. Report of deposits. Personal report of medical officers (to Surgeon-General). Personal report of staff officers (to Adjutant-General). Grade averages (to company commander). Changes in special-duty details and classes (to company commander). Schedule of calls. Requisition for fuel, forage, and straw (to the quartermaster).

Bimonthly.—Muster rolls. List of changes in Hospital Corps (to adjutant).

Quarterly.—Ordnance returns. Requisition for crockery, etc. (to quartermaster). Statement of charges on muster and pay rolls. Estimate for clothing and equipage (to quartermaster).

Annual.—Return of medical property. Estimate of repairs and alterations to hospital and hospital steward's quarters.

Occasional.—Descriptive book. Clothing book. Clothing schedule. Detached orders. Change of status, Hospital Corps. Record of summary courts-martial.

Charges and specifications. Discharges and final statements. Certificates of disability. Enlistment papers. Special qualification book. Class books and instruction records.

COURSE OF INSTRUCTION.

FIRST MONTH.

[Daily, except Saturday and Sunday.]

Anatomy and physiology, 1 hour.
Bandaging, 1 hour.
Diet cooking, 1 hour.
Bearer drill, 2 hours.
Calisthenics and company drill, one-half hour.

SECOND MONTH.

Nursing, 1 hour.
First aid, 1 hour.
Care of animals, 1 hour.
Bearer drill, 2 hours.
Calisthenics and company drill, one-half hour.

THIRD MONTH.

First aid, 1 hour.
Elementary hygiene, 1 hour.
Clerical work, 1 hour.
Materia medica, 1 hour.
Bearer drill. Practical field work, 2 hours.
Calisthenics and company drill, one-half hour.

FOURTH MONTH.

Clerical work, 1 hour.
Pharmacy, 1 hour.
Materia medica, 1 hour.
Practical field exercises, 2 hours.
Calisthenics and company drill, one-half hour.

SATURDAY.

Inspection.
Articles of War. Company regulations.

COURSE IN BEARER DRILL.

Calisthenics and setting-up drill, daily, one-half hour.
Calisthenic exercises, United States Army.
School of the soldier, Infantry Drill Regulations, paragraphs 10–43, 12 hours.
The detachment, Hospital Corps Drill Regulations, paragraphs 1–6; alignments, paragraph 7, 3 hours.
Marchings, paragraphs 8–22, 5 hours.
Turnings, paragraphs 23–49, 4 hours.
Total, 24 hours.
Litter drill, paragraphs 50–92, 8 hours.
The loaded litter, paragraphs 93–126, 6 hours.
Improvisation of litters, paragraphs 127, 132, 3 hours.
Removing wounded without litter, paragraphs 133–150, 5 hours.
The ambulance, paragraphs 151–164, 5 hours.
Tent drill and packing, paragraphs 173–187, 8 hours.
Inspection and muster, paragraphs 165–172, 1 hour.
Total, 36 hours.

Sixty hours are required for a recruit to become reasonably proficient in bearer drill as here laid down. This amounts to three months' instruction for one hour daily, excepting Saturdays and Sundays.

To continue proficient the recruit should have drill at least two hours per week for the next six months; after six months, for one hour per week. This drill should be given as part of practical field exercises.

With one experienced instructor for every eight men or less, the period required for proficiency can be reduced one-third.

Time taken for calisthenics and setting-up drill is not included in this estimate.

COMPANY DRILL.

[United States Army Infantry Drill Regulations.]

1. Definitions. 2. General principles. 3. School of the Soldier, paragraphs 10–30. 4. The Squad, paragraphs 114–142. 5. School of the Company; including movements by platoon, paragraphs 179–249.

ANATOMY AND PHYSIOLOGY.

[Textbooks: Smart's Handbook for the Hospital Corps. Doty's Prompt Aid to the Injured.]

First week: 1, 2, 3. Anatomy of the skeleton. 4. The muscular system. 5. Review.

Second week: 6. The nervous system. 7, 8, 9. The circulation of the blood. 10. Review.

Third week: 11, 12. The respiratory system. 13, 14. The alimentary system. 15. Review.

Fourth week: 16. Organs of excretion. 17. Organs of reproduction. 18. Organs of special sense. 19. Review. 20. General review.

BANDAGING.

1. Figure of eight, gauntlet. 2. Spica of the thumb, spiral reverse of upper extremities. 3. Spica of the shoulder, single. 4. Spica of the shoulder, double. 5. Spica of the foot, covering the heel. 6. Spiral reverse and figure of eight, lower extremity. 7. Spica of the groin, single. 8. Spica of the groin, double. 9. Barton's head bandage. 10. Velpeau bandage, for fracture of clavicle. 11. Triangular bandage. 12. The first-aid packet.

COURSE IN DIET COOKING.

First lesson, liquid diet.—Milk: Sterilized; milk punch; with mineral water; albumenized; peptonized; cold process; warm process; whey; junket.

Second lesson, liquid diet.—Gruels: Oatmeal; farina; rice; hard bread; arrowroot. Drinks: Koumyss.

Third lesson, liquid diet.—Drinks: Lemonade; orangeade; eggnog; egg lemonade; sherry and egg; toast water; coffee; tea.

Fourth lesson, liquid diet.—Broths: Beef juice; beef juice, bottled; beef tea, bottled; beef tea, with hydrochloric acid; beef broth; mutton broth; chicken broth.

Fifth lesson.—Review.

Sixth lesson, light diet.—Canned soups: Chicken; mutton; beef; clam broth. Eggs: Poached; cooked; boiled; omelet; custard.

Seventh lesson, light diet.—Toast: Dry; milk. Oatmeal: Porridge; mush. Rice: Plain boiled; steamed. Milk porridge.

Eighth lesson, light diet.—Gelatine: Lemon jelly; coffee jelly; wine jelly. Dried fruit: Stewed; baked. Fresh fruit: Stewed; baked. Canned fruit, serving of.

Ninth lesson, light diet.—Potatoes: Baked; roasted; boiled; mashed. Beef: Scraped; scraped, in sandwiches; broiled. Chicken: Stewed; minced, on toast.

Tenth lesson.—Review.

Eleventh lesson (hospital stores).—Beef extract: Bouillon; as an addition to soups. Malted milk, preparation of. Chocolate: As a beverage; as a flavoring. Arrowroot, blanc-mange. Condensed milk, general uses of. Sugar, general uses of.

Twelfth lesson (the ration).—Minimum field, travel, and emergency; general uses of. Hard bread: General uses of; toasted; toastwater; hard-bread mush; hard-bread as milk toast; brown betty. Bacon: General uses of; broiled; fried; boiled.

Thirteenth lesson (the ration).—Canned roast beef: Soup; stew; hash. Canned salt beef: Stew; hash.

Fourteenth lesson (the ration).—Rice pudding. Baked beans: Soup. Pea meal: Soup; mush. Tomatoes: Soup; stewed; baked.

Fifteenth lesson.—Review.

NURSING AND WARD MANAGEMENT.

[Text-book: Clara Week's "Nursing."]

1. Care and management of ward. 2. Beds and bed making. 3. Admission of patient. Care of effects. 4. Observation of symptoms. 5. Thermometers. Chartering of temperature. 6. Observation and recording of pulse and respiration. 7. Baths and bathing. 8. Disinfectants. Care of utensils, sputa cups, bedpans, urinals, etc. 9. Preparation of enemata and administration. 10. Medicine and its adminis-

tration. 11. Treatment of inflammation, medical and surgical. 12. Preparation of patient for operation. 13. Asepsis, antisepsis. 14. Ward dressings, surgical and medical. 15. Ward emergencies. 16. Nursing in typhoid fever. 17. Nursing in contagious diseases. 18. Nursing in convalescence. 19. Dissolution. Care of body. Autopsy. 20. Review.

OUTLINE OF COURSE IN FIRST AID.

[Text-books: Doty's Prompt Aid. Smart's Handbook. Hospital Corps Drill Regulations.]

I. Asepsis. II. Wounds and shock. III. Fractures and dislocations. IV. Foreign bodies. V. Asphyxia. VI. Hemorrhage. VII. Medical emergencies. VIII. First aid in the field.

I. Asepsis, or surgical cleanliness. Infection or sepsis. Disinfection and antisepsis. Suppuration.

II. Wounds.—Definition. Varieties. Characteristics of each variety. Characteristics of gunshot wounds. Poisoned and infected wounds. Healing of wounds. Causes of death from gunshot wounds. Indications to be met in treatment. Means at hand for treatment. Methods of exposing and examining of wounds. Diemer's rules. Treatment of poisoned and infected wounds. Burns and bruises. Freezing. Sprains.

Shock.—Causes. Symptoms. Diagnosis. Treatment. Treatment in the field.

Wounds of regions.—Symptoms peculiar to wounds of the various organs. The principles of treatment of wounds in each region.

III. Fractures.—Definitions. Varieties. The symptoms or signs. Ununited fractures. Compound fractures. Principles of first-aid treatment. Method of exposing fractures. Possible dangers of handling. Reduction. Splinting. Use of garments for support. Treatment of special fractures.

Dislocations.—Definitions. Characteristics of. Diagnosis. First-aid care and treatment of.

IV. Foreign bodies.—Eye. Ear. Throat. Symptoms. Dangers. Treatment.

V. Asphyxia.—Smothering by gases. Smothering by hanging. By pressure on the chest and other obstructions to breathing. Drowning. Principles of treatment of asphyxia. Rescuing. To restore breathing. Artificial respiration and other means.

VI. Hemorrhage.—The heart, arteries, and veins. Lines of arteries. Outlines traced on the skin. Points for pressure. Control of hemorrhage. Natural means. Necessity for artificial assistance. First-aid methods. Stopping hemorrhage by patient himself.

VII. Emergencies in general.—Symptoms. Diagnosis. What to look for. Indications of symptoms. General rules for emergencies. Most common causes: Injury, fainting, heat, alcohol. Other causes. Principles of diagnosis in the different cases. Symptoms and treatment of each.

Poisons.—General classes. Symptoms and treatment of each class. Usual means at hand for first-aid treatment. Emetics. Special poisons.

FIRST AID IN ACTIVE SERVICE.

Objects.—1. To stop severe hemorrhage. 2. To counteract shock. 3. To apply an antiseptic dressing. 4. To immobilize a fracture. 5. To transport to a place of safety.

Most important is rapid preparation for safe transportation.

Greatest danger to wounded man is infection from handling.

Nothing to touch wound except first-aid dressing. Aseptic handling of wounds is not possible on the firing line or at the dressing station.

Causes of death from gunshot wounds: Infection, shock, hemorrhage, injury to vital organ. If asepsis has been maintained the patient will usually recover unless vital organ has been seriously damaged.

Fate of wounded man is usually in the hands of person who applies the first-aid dressing.

CARE OF ANIMALS.

[Cavalry drill regulations.]

1. Nomenclature of equipments. 2. Grooming. 3. Handling. 4. Feeding. 5. Watering. 6. Care after exercise. 7. The halter. 8. Watering bridle. 9. Curb bridle. 10. Saddle. 11. Saddle blanket. 12. To mount and dismount, with and without saddle. 13. Position of trooper, mounted. 14. To roll bed blanket, over-

coat, and shelter half. 15. To pack saddle. 16. To harness horses and hitch ambulance. 17. The pack saddle.

ELEMENTARY HYGIENE.

Ventilation.
Disposal of wastes.
Drinking water. Water-borne diseases.
Infectious diseases.
Diseases of the Tropics and those to which soldiers are particularly liable: Diarrhea, dysentery, cholera, typhoid fever, malaria, yellow fever, tuberculosis, plague, venereal diseases, their modes of transmission, methods of prevention.
Personal hygiene of the soldier: Exercise, eating, drinking, bathing, care of the feet and hair, clothing and bedding, sleep.

COURSE OF INSTRUCTION IN CLERICAL WORK.

The nature, objects, and methods of preparation of the following reports are explained to the class and copies of the reports are examined and criticised. Each member of the class is required to prepare the reports printed in large type.

Daily reports.—1. Morning sick report. 2. Morning report of Hospital Corps detachment. 3. Detachment sick report. 4. Posting of register of patients. 5. Correspondence and current work.

Weekly reports.—Weekly report of detachment.

Trimonthly return.—Ration return of detachment and patients subsisted on the ration.

Monthly reports.—1. Report of completed cases. 2. Return of Hospital Corps and means of transportation. 3. Report of physical examination of recruits. 4. Statement, hospital fund account. 5. Statement, ice fund account (at posts having ice factory). 6. Personal report of medical officers. 7. Personal report and post-office address of staff officers (G. O., 108, 1898). 8. Sanitary report. 9. Report of repairs to hospital and hospital stewards' quarters. 10. Ration return for those rationed separately. Requisition for fuel, forage, etc. 11. Pay rolls.

Bimonthly reports.—1. Muster rolls. 2. (Report of changes in detachment for preceding two months, rendered on the last day of each month the muster roll is not made out.)

Quarterly reports.—1. Ordnance return. 2. Return of clothing and general equipment (quartermaster). General hospitals only.

Yearly reports and returns.—1. Return of medical property. 2. Estimate of repairs to hospitals and hospital stewards' quarters. 3. Annual requisition for medical supplies.

Occasional reports and returns.—1. Report of epidemic diseases. 2. Report of record books. 3. Report of deaths and interments. 4. Report of change of status, Hospital Corps. 5. Inventory and inspection reports. 6. Report of sales at public auction. 7. Report of change of combination of office safe. 8. Special requisitions, invoices, receipts, etc.

INSTRUCTION IN CLERICAL WORK.

List of records, reports, and returns required to be kept at army hospitals.

Hospital records.—Indorsement book. Letters received book. Letters sent book. Order book. Medical history of post. Records of deaths and interments. Register of sick and wounded. Morning report of sick and wounded. Information slip book. Transfer slip book. Summary court record. Register of examination of recruits.

Hospital Corps records.—Morning report book. Morning report of sick and wounded. Descriptive and clothing book. Statement of hospital fund.

Monthly reports.—Number of copies sent. To whom sent. Through what officer. Examination of recruits. Return of Hospital Corps. Return of hospital fund. Report of sick and wounded. Sanitary report. Personal reports of medical officers. Return of contract nurses.

Quarterly reports.—Returns of ordnance property and quartermaster's supplies.

Yearly reports.—Estimate of repairs to hospital and hospital stewards' quarters. Return of medical property. Requisitions for medical supplies.

Occasional reports.—Special requisition for medical supplies. Report of death of officers. Report of desertions. Report of epidemic diseases. Report of record books. Report of change in status of Hospital Corps and contract nurses. Report to Surgeon-General of soldiers discharged on certificate.

PHARMACY.

First week.—1. Metrology. 2. Metrology. 3. Operations requiring heat. 4. Operations requiring heat. 5. Review.

Second week.—1. Operations not requiring heat. 2. Operations not requiring heat. 3. The United States Pharmacopœia; official preparations. 4. Aqueous solutions. 5. Review.

Third week.—1. Alcoholic solutions. 2. Percolation. 3. Oleaginous solutions. 4. Ethereal solutions. 5. Review.

Fourth week.—1. Solid preparations. 2. Solid preparations. 3. Solid preparations. 4. Formulæ. 5. Review.

MATERIA MEDICA.

First week.—1. The medical supply table. 2. Classification of drugs on the medical supply table. 3. Definitions. 4. Definitions. 5. Review.

Second week.—1. Oxygen, hydrogen, and water. 2. Acids (mineral). 3. Acids (organic). 4. Alkalies (potassium, sodium, lithium, ammonium). 5. Review.

Third week.—1. Magnesium, zinc, and iron. 2. Lead, copper, and silver. 3. Mercury. 4. Antimony, arsenic, and bismuth. 5. Review.

Fourth week.—1. Alkaloids. 2. Volatile oils. 3. Fixed oils and fats. 4. Animal products. 5. General review.

ONE MONTH'S COURSE IN PHARMACY AND MATERIA MEDICA.

First week.—(1) The dispensary, cleanliness, arrangement of bottles, poison closet and stores; care of scales and utensils. The United States Pharmacopœia and the medical supply table. (2) Use of weights and measures: The troy, avoirdupois, and metric systems. (3) Distillation; sublimation; comminution; trituration, and solution. (4) Filtration; clarification; precipitation; crystallization; maceration; percolation. (5) Review.

Second week.—The official preparations, with definitions, sources, and strength, with special regard to those on the supply table. (1) Waters, liquors, sirups, mucilages, emulsions, mixtures, and infusions and decoctions. (2) Spirits, tinctures, fluid extracts, collodions, wines, vinegars, and oleoresins. (3) Extracts, resins, powders, triturations, masses, and pills. (4) Troches, cerates, ointments, plasters, papers, and suppositories. (5) Review.

Third week.—(1) Organic and inorganic acids most commonly used, their characteristics, use, and dose. (2) Alkalies and salts (sodium, potassium, lithium, and ammonium), source, use, and dose. (3) Alkaloids in general. Opium and nux vomica, source, use, dose, and different methods of administration. (4) Belladonna coffee, cinchona, coca, conium, hyoscyamus, physostigma. (5) Review.

Fourth week.—(1) Mercurial and iron preparations and their salts on the medical supply table; source, percentage, use, and dose. (2) Lead, copper, silver, arsenic, bismuth, etc., and their most important preparations. (3) Volatile and fixed oils; source, use, and dose. (4) Dosage and general review. (5) General review.

To enable the student more readily to grasp the meaning of the lecture, samples of the drug in its crude form, its preparations, and the package containing same as received from the supply depot, and tests for identification of the drugs are made.

FIELD WORK.

1. First aid in the field. 2. The use and care of the articles of field-hospital equipment. 3. Pitching, striking, and packing field hospitals; their organization and the distribution and use of the equipment. 4. The organization of an ambulance company; its work in action, illustrating the establishment of the aid stations and the duties of the Medical Department personnel from front to rear.

FIELD-HOSPITAL EQUIPMENT.

Hospital Corps personal equipment.—Clothing roll. Hospital Corps and orderly pouches. Litter sling. Canteen. Haversack and field mess furniture. Waist belt. Shelter tent.

Medical property.—Supplied by the Medical Department. The chests: Medical, surgical, sterilizer, detached service, mess, food, commode. The folding field furniture. Other articles: Buckets, lanterns, hatchets, litters, etc. Medicines, antiseptics

and disinfectants, hospital stores, stationery, surgical instruments, appliances, and dressings, furniture, bedding, and clothing, etc. See Field Supply Table, Manual for the Medical Department.

Camp equipage.—Supplied by the Quartermaster's Department. Flags, guidons, colors, mauls, field ranges, shovels, spades, tents, Sibley stoves, Waterhouse-Forbes water sterilizers, coal oil.

Means of transportation, etc.—Supplied by the Quartermaster's Department. Ambulances, wagons, travois, horses, and mules. Forage, ambulance and wagon harness.

Articles of horse equipment.—Supplied by the Ordnance Department. Saddles, curb bridles, watering bridles, halters, saddle blankets, saddle bags, currycombs, horse brushes, surcingles, side lines, picket pins, lariats, lariat straps, horse covers, nose bags.

Rations and subsistence stores.—Supplied by the Commissary Department. Rations for the enlisted and civilian personnel. Subsistence stores for the sick.

NONCOMMISSIONED OFFICERS' CLASS—PROPERTY RESPONSIBILITY AND ACCOUNTABILITY.

MEDICAL DEPARTMENT.

Accountability.—Army Regulations, 739 to 807, 1163 to 1177, 1346, 1347. Manual for the Medical Department, 88 to 92.

How obtained.—Medical Manual, 77 to 87, 102 to 108, 136, 137, and 208 to 297. Army Regulations, 1666. Smart's Handbook, 17.

Care of and disposition of.—Medical Manual, 56, 57, 88 to 92, 93, 94 to 105, 106, 107, 108 to 110, 112 to 119, 121 and 122.

QUARTERMASTER'S DEPARTMENT.

Accountability.—See Army Regulations and Medical Manual given for "Medical property."

How obtained.—Army Regulations, 593 to 602, 603 to 619, 620 to 675, 1080 to 1087, 1101 to 1109, 1110 to 1128, 1129 to 1135, 1136 to 1140, 1148 to 1150, 1151 to 1162, 1181, 1286 to 1330.

Care of and disposition of.—Army Regulations, 1080 to 1087, 1148 to 1150, 1325, 1330. See also paragraphs in Medical Manual and Army Regulations given for medical property. See also Compendium of Regulations for the Quartermaster's Department.

ORDNANCE DEPARTMENT.

Accountability.—See paragraphs in Medical Manual and Army Regulations given for "Medical property."

How obtained.—Medical Manual, 247. Army Regulations, 1694 to 1712.

Care of and disposition of.—Army Regulations, 1717 to 1737. Also paragraphs in Army Regulations and Medical Manual under heading of "Medical property" relative to this subject.

COMMISSARY DEPARTMENT.

Subsistence stores.—The ration, Army Regulations, 1377 to 1402. Other subsistence stores, 1403 to 1406. Medical Manual, 69 to 73. Subsistence stores for the sick. Medical Manual, 58.

COURSE IN MINOR SURGERY.

1. Asepsis and antisepsis, preparation of patient, surgeon, and assistants for operation. 2. Preparation of surgical dressings, sterilization of same; sterilization of instruments. 3. Anæsthesia and anæsthetics. 4. Artificial respiration. 5. Hypodermic medication. 6. Catherization, stomach and rectal tubes. 7. Bandaging, fixed dressings. 8. Counter irritation. 9. Dry and wet cups. 10. Emergencies, medical and surgical.

ARMY REGULATIONS, 1901.

	Paragraph.
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Quartermaster's Department	1076–1082
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Subsistence Department	1351, 1356, 1377, 1380–1402, 1407–1410, 1421, 1423, 1426
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Medical Department	1570, 1571, 1590–1644, 1648, 1651–1655, 1666–1670, 1672
Uniforms	1756–1760, 1761

PRACTICAL COURSE IN PHARMACY.

First week.—1. Practical problems, illustrating the uses of weights and measures. 2. Solutions, simple and chemical. 3. Generation of heat, evaporation and distillation. 4. Filtration, clarification, precipitation, crystallization. 5. General review.

Second week.—1. Practical problems, etc., preparation of aquæ, liquors, etc. 2. Sirups, emulsions, mixtures, and spirits. 3. Elixirs, liniments, infusions, decoctions. 4. Tinctures, fluid extracts, extracts. 5. General review.

Third week.—1. The army dispensary, care of stores and utensils. 2. Prescriptions, the parts of: Art of dispensing and compounding, filing, binding, preserving. 3. Chemical and physical incompatibility. 4. Extemporaneous solutions, mixtures, and emulsions. 5. General review.

Fourth week.—1. Powders, tablets, capsules. 2. Pills, suppositories. 3. Ointments, plasters. 4. Unofficial preparations. 5. General review.

PHARMACY.

First week.—1. The medical supply table. 2. The dispensary. 3. The prescription counter and poison chest. 4. The storerooms. 5. Review.

Second week.—1. The prescription. 2. Nomenclature. 3. Incompatibility. 4. The art of dispensing and compounding. 5. Review.

Third week (liquid preparations).—1. Solutions. 2. Sirups. 3. Mixtures. 4. Emulsions. 5. Review.

Fourth week (solid preparations).—1. Powders. 2. Pills. 3. Suppositories. 4. Ointments. 5. General review.

At the request of the military authorities of Pennsylvania, this company, Hospital Corps, took part in the mobilization of the National Guard of that State at Gettysburg, with results as set forth in a valuable report by Capt. F. P. Reynolds, assistant surgeon, United States Army, commanding the company, from which the following is extracted:

At the time of receipt of the order there were available for this duty at Gettysburg 8 noncommissioned officers and 42 privates, it being necessary to leave a sufficient detail for duty in the general hospital and company of instruction. The company consisted of Capt. F. P. Reynolds, assistant surgeon, U. S. Army, in command, and First Lieut. James R. Church, assistant surgeon, U. S. Army, 8 noncommissioned officers, and 42 privates of the Hospital Corps

In order to make a trial of the various articles of field equipment for use of the Medical Department and to show them at the encampment, it was decided to take with the company a complete equipment for a 12-bed regimental hospital. This equipment comprises all the articles now furnished by the various supply departments for field hospital use. The equipment was readily packed and carried by one escort wagon and weighed about 2,100 pounds.

The transportation consisted of 3 four-mule wagons, one of which carried the field hospital equipment, 1 pack mule, and 1 two-horse ambulance. The medical officers and one orderly were mounted. The pack mule was taken in order to make a trial

of the present pack saddle supplied the Medical Department, and to observe the manner in which the medical and surgical chests would withstand such transportation; also, it was desired to use it in instructing a number of noncommissioned officers and men in the arrangement of pack and method of packing.

The personal equipment of the men was as follows:

2 pairs khaki trousers.
1 khaki blouse.
1 campaign hat.
2 blue shirts.
1 pair tan shoes.
1 pair black shoes.
2 suits underwear.
4 pairs socks.
2 towels.
4 handkerchiefs.
2 blankets.
1 poncho.
1 shelter tent, half.
1 blue uniform.
1 forage cap.
2 white collars.
1 white shirt.
2 pairs Berlin gloves.
Toilet articles.
1 haversack.
1 canteen.
1 waist belt.
1 Hospital Corps pouch.
1 litter sling.

The men marched in blue shirts, khaki trousers and leggings, tan shoes, and campaign hats and carried Hospital Corps pouches, canteens, and waist belts. The remainder of the equipment was packed in the clothing roll and carried by wagon.

Field rations were carried for ten days, and arrangements were made to have forwarded to Gettysburg a like number of rations.

The route of march was from Washington to Rockville over the Rockville pike; from Rockville to Urbana over country road; from Urbana to Frederick, and from Frederick to Emmitsburg over turnpike; from Emmitsburg to Gettysburg over country road. The length of the march is estimated at about 86 miles. The start was made at 7 a. m. July 3. The first camp was made 2 miles beyond Bethesda post-office, 13 miles from the barracks; second was at Gaithersburg, about 13 miles; third at Hyattstown, 12 miles; fourth at Harmony Grove, 16 miles; fifth at Catoctin Furnace, 9 miles; sixth at Emmitsburg, 11 miles, and the seventh at Gettysburg, 10 miles.

The weather throughout the march was hot and sultry and a thunderstorm occurred each afternoon. In order to avoid marching in the heat of the day, reveille was sounded at 4 a. m., breakfast at 4.30, and the march taken up soon after 5 a. m. By thus marching in the early morning hours camp was usually reached before noon and the afternoon devoted to rest and recreation.

The return march was made over the same route, but in much shorter time, the camps being as follows: First, Catoctin Furnace, 20 miles; second, Frederick, 13 miles; third, Neelsville Church, 23 miles; fourth, Washington Barracks, 30 miles. The weather on the return march was favorable for marching, there being considerable cloudy weather and a fair breeze most of the time.

The men suffered some from sore feet on the march up, as none of them were accustomed to marching and the majority of them were recruits. On two or three days it was necessary to carry one to three men in the ambulance from this cause, but on no day did the number so carried exceed three, and on the last day's march all men could march. On the return trip there were no men carried in the ambulance from any cause.

On the arrival at Gettysburg the company was met by the quartermaster-general of the Pennsylvania National Guard, who directed the company to the site selected for their camp. This proved to be suitable in every respect and most conveniently located. The site was a field of about 4 acres, somewhat elevated, with a gentle slope toward the west. It was on the Emmitsburg road at the junction of two branches of the trolley line and about 100 yards to the west of the high-water mark monument. The division headquarters of the national guard were about 200 yards distant. Two brigades of the guard were on our left and one brigade on our right, but several yards distant in both directions.

On arrival in camp a regimental field hospital was pitched, in accordance with a plan herewith inclosed, and in the hospital was distributed the equipment. Each morning this was prepared for inspection and ready for immediate use, and noncommissioned officers and men were detailed to care for it and to explain its uses to all visitors. The hospital was visited by a number of officers and men of the national guard outside of the medical department, and it is believed that all officers and men of the medical department saw the hospital and inspected it thoroughly. It was most gratifying to note the interest which was taken in the equipment and in the hospital corps on duty in the hospital by many of the senior officers of the guard.

Through the courtesy of Lieutenant-Colonel Weaver, chief surgeon of the national

REGIMENTAL FIELD HOSPITAL OF THE HOSPITAL CORPS COMPANY OF INSTRUCTION, U. S. A., WASHINGTON, D. C., AT GETTYSBURG, PA., JULY 12, 1902.

guard, the company was requested to give two exhibition drills before the entire medical department of the guard. The first exercises were held July 14 at 9 a. m., on the grounds adjoining the headquarters of the second brigade and included an exhibition of hospital corps drill as given in the present drill regulations, each movement in the regulations being executed by the detachment. The second exhibition was given at 9 a. m., July 17, in front of the headquarters of the division. It consisted of the first-aid exercises, in which were shown in part the duties of an ambulance company in action. This included the establishment of a dressing station and the dressing of twelve wounded men. At this exhibition the company was honored by the presence of Governor Stone, of Pennsylvania, and the commanding-general of the division, Major-General Miller, who showed the greatest interest in the exercises and followed the work of the men through all its stages.

The encampment ended July 19, on which date the return march was begun.

I desire to make most grateful acknowledgment for courtesies extended and for the many careful arrangements which made the encampment a perfect one, to Major-General Miller, commanding Pennsylvania National Guard, to Brigadier-General Steward, adjutant-general, to Lieutenant-Colonel Weaver, chief surgeon, and to Lieutenant-Colonel Richardson, quartermaster-general.

The marching to Gettysburg and return was of value to the Medical Department in many ways. The chief one, I think, consisted in demonstrating the fact, perhaps not generally known, that the Medical Department is capable and prepared for independent work in the field and can perform its own quartermaster and commissary duties, provided it has authority therefor.

The discipline of the men on the march and in camp was most satisfactory, and reflected great credit on them and on the organization to which they belong. In but one or two instances was it necessary to administer punishments, which were for minor delinquencies. Two were tried by summary court. The spirit shown was at all times commendable, and this and the high standard of intelligence were freely commented upon by all those who came in contact with the company.

This is the first time to my knowledge that an organization of the Medical Department has made an independent march in time of peace, and although the command was small and the march a short one, yet the conditions were similar to those existing with larger commands and on more extended marches.

Much practical experience was gained regarding marches, camps, transportation, packing, management of the ration in the field, and many other details which are of importance in making a creditable march. In addition an opportunity was given to observe a division of State troops in the field and to study their methods of transportation, supply, instruction, and camp sanitation.

Medical officers of the Pennsylvania National Guard were kind and hospitable to a degree, and I feel under many obligations to them. As is well known, they represent the very best of the medical profession in their State. Their hospital corps, consisting largely of practitioners of medicine, graduate pharmacists, and nurses, is of the very best material, and maintains the same high interest in its work. Some of the drills which I had the opportunity to see would reflect credit upon any Hospital Corps detachment in the regular service.

During the year 337 men have been instructed in the company at Washington Barracks, of which number 283 were distributed chiefly to the Philippines, 4 were promoted while with the company to the grade of hospital steward and 33 to the grade of acting hospital steward, and 9 were detailed as lance acting hospital stewards.

Capt. John S. Kulp, assistant surgeon, U. S. Army, assumed command of the company of instruction, Hospital Corps, at Fort McDowell, Angel Island, Cal., March 19, 1902, and with his well-known energy has devoted himself to advancing its efficiency. It is regretted that the dearth of regular medical officers has been so great that thus far it has been found impracticable to assign another officer to assist Captain Kulp in his really arduous task. Nine hundred and sixty-one noncommissioned officers and men have passed through this organization during the year.

The company of instruction at Manila, which had attained a high degree of efficiency, was disbanded by order of the division commander August 13, 1901.

Uniform and equipment.—The uniform of the Army, including, of course, the Hospital Corps, was changed in General Orders, No. 81, Headquarters of the Army, Adjutant-General's Office, July 17, 1902. The changes made in the uniform of enlisted men of the Hospital Corps consist principally in the substitution of maroon for the emerald green heretofore prescribed for stripes, chevrons, etc., and of the caduceus in the place of the maltese cross, both for cap and collar ornaments and for chevrons. The modified maltese cross in green heretofore worn by privates on both sleeves is substituted by a caduceus in maroon silk, having a white border, to be worn on the dress coat and overcoat only. The overcoat is the same as for all enlisted men of the Army, viz, of olive drab wool material.

The equipment consists of fair-leather belt, shelter half, shelter poles, canteen complete, haversack complete, and tin cup for all enlisted men of the Hospital Corps. In addition to this, privates carry Hospital Corps pouch and litter sling.

The esprit de corps, which has never failed to actuate the members of this fine organization, which bears not only its full share of the hardships and dangers of the campaign and the battle, but the stress and dangers of epidemics as well, has lost nothing of its fervor during the last year. The following named have been especially commended since the date of last report:

Private Milton McCoy, Hospital Corps, was granted a certificate of merit in February, 1902.

The following-named members of the Hospital Corps have been recommended for certificates of merit during the past fiscal year:

Private Thomas Hamilton, for distinguished services in the attack on Tientsin, China, July 13, 1900, for succoring the wounded under a most severe fire of all arms.

Private David L. Van Arman, for the high order of courage and devotion to duty shown by him throughout the campaign against the insurgent mountain stronghold near La Paz, and especially during the fight on April 26, 1900.

Private Archie D. McMurdo, for rescuing a companion from drowning in the Potomac River at Washington Barracks, D. C., July 4, 1901.

Acting Hospital Steward Walter K. Barnes, for going forward to the firing line June 3, 1900, in an engagement with insurgents and rescuing Private Perry G. Ethridge, Company A, Twenty-second Infantry, having to pass over completely exposed ground and through an intense fire.

Private George Metzger, for distinguished services in the face of and in action with the enemy.

Private William H. Phelps, for distinguished services in action at Maincling, Luzon, on the night of July 4, 1900. Under a terrific fire he left the dressing station and went to the trenches to administer to the wounded.

Private Earl W. Kitchen, for conspicuous gallantry and devotion to duty in caring for his comrades when almost exhausted.

Private Jesse Rutledge, for gallant and meritorious services in rendering first aid to the wounded at Lubao, Luzon, October 29, 1899. Private Rutledge was shot immediately after contact was made with the insugents, but he continued to fight and render first aid for about 6 miles from Lubao.

Private Edward C. Knox, for faithful devotion to duty during an epidemic of smallpox at Bangar in July and August, he having contracted the disease at that time.

Private Louis Bertrand, for conspicuous gallantry and devotion to duty in caring for his comrades when almost exhausted and while under a heavy fire, June 19, 1899.

Private Julius Heinze, for bravery in action and meritorious conduct in attending to other wounded after he had been shot through both arms, and was severely cut across the back by native riflemen and bolomen, in Samar, and for distinguished services in the attack on Tientsin, July 13, 1900, in succoring the wounded under a a most severe fire of all arms.

Private Lewis Hansen, for volunteering and nursing two very severe cases of confluent smallpox.

Hosp. Steward Adolph K. Bernes was appointed second lieutenant, Philippine Scouts, in October, 1901.

Hosp. Steward Paul Weyrauch appointed second lieutenant of cavalry in May, 1902.

Private Jason M. Walling appointed second lieutenant, Nineteenth Infantry, in July, 1901.

Hosp. Steward Charles G. Sturtevant, having passed the preliminary examination, was ordered, in August, 1902, to appear before the board at Fort Leavenworth for examination for promotion to second lieutenant, U. S. Army.

Private Graham L. Milligan was admitted to the preliminary examination at Fort Columbus, N. Y., also Acting Hosp. Steward John E. Williams.

Private Norman E. Williamson was discharged in November, 1901, to accept a position in the government biological laboratory at Manila.

It is possible that not all are mentioned in this list that are entitled to be, as copies of reports of this character are not invariably furnished this office.

From the organization of the Hospital Corps, and especially during and since the Spanish-American war, the country is especially indebted to that splendid body of noncommissioned officers, the hospital stewards of the Army, whose intelligent devotion to duty under the most trying circumstances has contributed no little to whatever success has attended the accomplishment of the herculean tasks which have fallen to the Medical Department.

I take pleasure in bearing testimony to the invaluable work done by these devoted servants of the Government.

ARMY NURSE CORPS.

On June 30, 1901, there were in service 178 nurses. During the fiscal year 1902, 38 nurses were appointed and 97 discharged, leaving 119 in service at the end of the year. Sixteen of the discharges in Manila were granted at the request of the nurses themselves, who desired to accept civil positions there.

Of the 119 now in service, 63 are in the Philippines and 56 in the United States. Of those in the Philippines, 34 are on duty at the First Reserve hospital, 6 at Corregidor Island, 5 at Dagupan, 6 at Calamba, and the same number at Iloilo and transferred from Vigan. Of those in the United States, 39 are on duty at the general hospital, Presidio of San Francisco, Cal., 9 at Fort Bayard, N. Mex., and 8 awaiting orders.

The desirability of a place in some army hospital in or near Washington where nurses could serve a probationary period is fully realized. The advantages of such an arrangement would be manifold. The superintendent would have an opportunity to personally observe each candidate before making recommendations for her permanent appointment, the examinations required by law could be made more thorough, and the risk of assigning unqualified or undesirable nurses to distant hospitals, involving a long and expensive journey, would be minimized.

The nurses seem to have made a place for themselves in army hospitals, and chief surgeons and commanding officers speak in high commendation of their services and conduct. One of the latter writes that "The nurses are entitled to the greatest praise and consideration."

MEDICAL AND HOSPITAL SUPPLIES.

The operations of the supply department have been continued in the same manner as submitted in the annual report for 1900–1901. Whenever surplus appeared in the depots in Porto Rico, Cuba, and the Philippines, owing to reduction in the military occupation of those

islands, the stores were returned to the depots in the United States and applied to the ordinary issues.

A medical board was convened to revise the supply table of the Medical Department in order to give it the benefit of the experience gathered during the late war in the composition, allowance, methods of supply, and equipment. Those articles which require considerable time for manufacture, such as medical and surgical chests, and the medical equipment of field hospitals, with the exception of perishable articles, have been manufactured on the improved models, and there are now stored in the supply depot of the fireproof army museum building complete outfits for 160 regiments, in the supply depot at San Francisco the equipment of a division, and in New York that of a brigade. The perishable articles are omitted, but can be added in a few days in case of mobilization. In addition to this there is a large amount of medical equipment distributed at the military posts, sufficient for supply to respective garrisons.

The equipment of three modern field hospitals on the basis of the new supply table, 1902, is about being assembled, one to be issued to Fort Riley for trial during the autumn maneuvers, one to the San Francisco supply depot for possible emergency or use in the contemplated camp, and one at the medical supply depot in Washington for possible emergency.

It is proposed later on to assemble those of the imperishable parts of field hospital equipment which consume much time in manufacture, so as to have a number of field hospitals sufficient for any emergency for which the regimental equipments are in stock.

It is believed that the Medical Department is now better prepared than ever to meet any demands called for by sudden emergency.

RECRUITING.

The total number of men examined for enlistment during the year 1901 was 58,782, of whom 56,894 were white and 1,888 were colored. The number accepted was 36,721, or 624.70 out of every thousand examined. The ratio of accepted men was 623.93 for the white and 647.78 for the colored. White men to the number of 86.67 and colored men to that of 69.38 per thousand declined enlistment. The rate of rejection on primary examination was 289.40 among the white and 282.84 among the colored candidates, giving a mean of 289.19.

Of every thousand examined 64.76 were rejected on account of imperfect physique, including overheight, underheight, overweight, and underweight; 41.14 for diseases of the eye; 38.74 for diseases of the circulatory system; 28.51 for diseases of the geneto-urinary system; 20.74 for venereal diseases; 19.96 for diseases of the digestive system; 13.00 for hernia, while 10.55 were rejected as generally unfit or undesirable; 6.80 were rejected as minors; 5.48 as unclassified; 5.12 for diseases of the integument and subcutaneous connective tissue; 4.27 for diseases of the muscles, bones, and joints; 3.10 on account of bad or doubtful character, while only 2.35 were rejected on account of illiteracy, imperfect knowledge of the English language, or mental insufficiency.

Of every thousand of the accepted men 884.97 were natives of the United States, 33.44 were born in Germany, 24.78 in Ireland, 12.50 in England, 10.81 in Canada, 5.28 in Sweden, 4.49 in Russia, 3.70 in Austria, the remainder in various other countries.

Number of white and colored applicants for enlistment examined physically during the year 1901, with the number accepted, rejected on primary examination, and declined, with ratios per thousand.

	White.		Colored.		Total.	
	Number.	Ratio per 1,000 examined.	Number.	Ratio per 1,000 examined.	Number.	Ratio per 1,000 examined.
Examined	56,894	1,000.00	1,888	1,000.00	58,782	1,000.00
Accepted	35,498	623.93	1,223	647.78	36,721	624.70
Rejected	16,465	289.40	534	282.84	16,999	289.19
Declined	4,931	86.67	131	69.38	5,062	86.11

In addition to the foregoing, 29 Indians were examined, of whom 27 were enlisted as scouts and 2 for regular service.

Nativity of white and colored recruits accepted during the year 1901, with ratios per thousand accepted.

Nativity.	White.		Colored.		Total.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
United States	31,282	851.88	1,215	33.09	32,497	884.97
England	458	12.47	1	.03	459	12.50
Scotland	98	2.67			98	2.67
Wales	16	.44			16	.44
Ireland	910	24.78			910	24.78
Canada	395	10.76	2	.05	397	10.81
Other British	39	1.06	1	.03	40	1.09
France	36	.98			36	.98
Belgium	12	.33			12	.33
Holland	35	.95			35	.95
Denmark	102	2.78			102	2.78
Norway	91	2.48			91	2.48
Sweden	194	5.28			194	5.28
Germany	1,228	33.44			1,228	33.44
Switzerland	72	1.96			72	1.96
Austria	136	3.70			136	3.70
Bohemia	36	.98			36	.98
Hungary	35	.95			35	.95
Poland	40	1.09			40	1.09
Russia	165	4.49			165	4.49
Finland	16	.44			16	.44
Italy	55	1.50			55	1.50
Others	47	1.28	4	.11	51	1.39
Total foreign	4,216	114.81	8	.22	4,224	115.03
Grand total	35,498	966.69	1,223	33.31	36,721	1,000.00

Causes of rejection among 58,782 candidates for enlistment examined during the year 1901, with ratios per 1,000 examined.

	Number examined	White, 56,894.		Colored, 1,888.		Total, 58,782.	
	Causes of rejection.	Number rejected.	Ratio per 1,000.	Number rejected.	Ratio per 1,000.	Number rejected.	Ratio per 1,000.
1	Venereal diseases	1,118	19.65	101	53.50	1,219	20.74
2	Other infectious diseases	199	3.50	9	4.77	208	3.54
3	Diseases of nutrition, general	129	2.27			129	2.19
4	Diseases of the nervous system	164	2.88	1	.53	165	2.81
5	Diseases of the digestive system	1,143	20.09	30	15.89	1,173	19.96
6	Diseases of the circulatory system	2,224	39.09	53	28.07	2,277	38.74
7	Diseases of the respiratory organs	163	2.86	3	1.59	166	2.82
8	Diseases of the genito-urinary system	1,647	28.95	29	15.36	1,676	28.51
9	Diseases of the lymphatic system and ductless glands	72	1.27	7	3.71	79	1.34
10	Diseases of the muscles, bones, and joints	247	4.34	4	2.12	251	4.27
11	Diseases of the integument and subcutaneous connective tissue	291	5.11	10	5.30	301	5.12
12	Diseases of the eye	2,371	41.67	47	24.89	2,418	41.14
13	Diseases of the ear	236	4.15	5	2.65	241	4.10
14	Diseases of the nose	51	.90			51	.87
15	Hernia	741	13.02	23	12.18	764	13.00
16	Other injuries	142	2.50	2	1.06	144	2.45
17	Overheight	1	.02			1	.02
18	Underheight	156	2.74	7	3.71	163	2.77
19	Overweight and obesity	26	.46			26	.44
20	Underweight	818	14.40	14	7.42	832	14.15
21	Imperfect physique	2,722	47.84	63	33.37	2,785	47.38
22	Mental insufficiency	27	.47			27	.46
23	Overage	32	.56			32	.54
24	Minor	396	6.96	4	2.12	400	6.80
25	Married or having dependent relatives	124	2.18	8	4.24	132	2.25
26	Illiteracy	69	1.21	11	5.83	80	1.36
27	Imperfect knowledge of English	31	.54			31	.53
28	Reenlistment disapproved for various reasons	64	1.12	2	1.06	66	1.12
29	Character bad or doubtful	180	3.16	2	1.06	182	3.10
30	Reference, none or unsatisfactory	14	.25	1	.53	15	.26
31	Aliens	7	.12			7	.12
32	General unfitness and undesirable	598	10.51	22	11.65	620	10.55
33	No vacancies	5	.09	11	5.83	16	.27
34	Unclassified	257	4.52	65	34.42	322	5.48
	Total	16,465	289.40	534	282.84	16,999	289.19

IDENTIFICATION OF DESERTERS AND OTHER UNDESIRABLE MEN.

From July, 1890, the time of the first identification, to June 30, 1902, 2,827 cases have been reported to the Adjutant-General of the Army. In 29 of these cases the indentification was not verified because sufficient evidence could not be obtained or because the individual died, escaped, or deserted before his case could be investigated.

Of the 2,030 cases identified up to the end of 1900, 489 men were held to service, 990 were dishonorably discharged, 300 deserted, and 251 were reported for the information of the Adjutant-General, the men having gotten out of the service before the case was reported.

HEALTH OF THE ARMY.

The rates of admission to sick report for disease and injury, the rate of discharge for disability, and the mortality rate for the calendar year 1901 all agree in being considerably less than the corresponding rates of the year 1900. This shows the gradual improvement in the condition of the troops, notwithstanding the fact that many of them were subject to the exposures of the tropical service in the Division of the Philippines. That the rates continue to be higher than

the average rates of the previous decade, 1890–1899, is to be expected, for during eight of those ten years the Army was on home service in time of profound peace, and, owing to the great attention paid to sanitary conditions, had lower rates than at any time in its previous history. A gradual approach to the lessened rates of the decade may be seen in each of the items of the record of morbidity. Thus, the admissions to sick report in 1901 constituted 1,791.59 per thousand of the strength as compared with 2,311.81 in 1900 and with 1,502.47, the mean annual rate of the previous ten years. The rate of discharge for disability was 19.95 in 1901 as compared with 22.60 in 1900 and with 16.69 for the decade, and the death rate from all causes was 19.94 per thousand men as compared with 22.74 and 11.91, respectively. Deaths from disease constituted 9.58 per thousand of mean strength as compared with 15.79 in 1900 and with 8.49 during the years of the decade, and deaths from injury 4.36 as compared, respectively, with 6.95 and 3.42.

During the year the mean strength of the Army consisted of 92,491 men, of whom 81,885 were regulars and 10,606 volunteers.

The admission rate for troops serving in Porto Rico was 1,367.74 per thousand of strength, in the United States 1,550.25, in Cuba 1,557.49, and in the Pacific islands and China, 1,928.14. The death rate from all causes was 5.29 per thousand of strength in Cuba, 6.90 in the United States, 7.81 in Porto Rico, and 17.96 in the Pacific islands and China. Deaths from disease constituted only 3.21 per thousand in Cuba, 4.68 in the United States, and 12.40 in the Pacific islands and China. The mean strength of the commands were: In Porto Rico 1,153, in Cuba 5,297, in the United States 26,515, and in the Pacific islands and China 59,526.

At the beginning of the year the Division of the Philippines was made up of the departments of northern and southern Luzon, the Visayas, and Mindanao and Jolo. These departments were subdivided into districts, and the troops in Manila constituted a separate brigade. In July, 1901, the military designation of this separate brigade was changed to the Post of Manila, and it was made a part of the Department of Northern Luzon. In December, 1901, the departments of northern and southern Luzon were consolidated into the Department of North Philippines and the departments of the Visayas and Mindanao and Jolo into the Department of South Philippines. The districts had been abolished a month previous to this, brigades taking their place. Since then the organization has been: Department of North Philippines, headquarters, Manila, composed of four separate brigades, with headquarters at Dagupan, Pangasinan; San Fernando, Pampanga; Batangas, Batangas; Nueva Caceres, Camarines Sur, and Department of South Philippines, headquarters, Cebu, Cebu, with three brigades, headquarters, respectively, at Iloilo, Panay; Tacloban, Leyte, and Zamboanga, Mindanao.

During the fiscal year many changes have taken place also in the number of troops in the division and in the stations occupied. Both of these last have been greatly reduced. Regiments, too, have been greatly changed, nearly all those which arrived in 1899 having been transferred to the United States.

The character of service in the different parts of the archipelago has varied more during the year than in any similar period since American occupation. Although a great deal of hard field service has been done

and much new country occupied, there has been a decrease in sick and mortality rates, for improved conditions in peaceful provinces have more than counterbalanced any local increase caused by arduous field service. Campaigns carried on during the year have not, however, been less trying to the stamina of troops than former ones; rather the reverse, as most of the more accessible points were already occupied by our forces at the beginning of the year and the necessity for following insurgents, hiding in the fastnesses of inaccessible mountains, added much to labors performed in the sweltering heat of the Tropics.

Col. C. L. Heizmann, assistant surgeon-general, U. S. Army, in an admirable report covering the period of his service as chief surgeon of the division, has given an interesting account of the medical and sanitary conditions affecting the troops and the civil population.

Prior to turning over the government to the civil authorities in July, 1901, a great deal had been done under military administration for the sanitary improvement of the Philippines. At that time the control of sanitary matters passed from a military board of health in Manila and from individual medical officers in the provinces, who acted in all stations as sanitary officers, to an insular board of health. This board was made up in great part of medical officers of the Army regularly detailed thereto under a member of the Commission. In provinces still under military control medical officers have acted as sanitary officers, as heretofore, and under their direction towns were cleaned, the inhabitants were vaccinated, venereal diseases controlled, contagious diseases isolated, and all necessary sanitary measures taken.

In Batangas especially, the policy of campaign pursued of gathering together inhabitants within certain zones into designated towns allowed such strict supervision by medical officers of the Army that the conditions under which the natives lived were better than ever before in the history of these islands. The natives were fed and clothed and compelled to observe sanitary laws; in consequence the death rates were much lower in the so-called reconcentration towns than in any other part of the archipelago.

Although the civil board of health as organized was intended to exercise general control of sanitary matters throughout the islands, their efforts were necessarily restricted to a great extent to the city of Manila. Provincial and municipal boards were organized, but neither a sufficiently intelligent personnel nor interest could be commanded to accomplish great results and outside of Manila, except in provinces under military control, sanitary conditions gradually grew worse until cholera appeared in March, 1902, when, at the request of the civil governor, medical officers of the Army were given practical control of sanitary matters outside of the city at all stations of troops and in towns adjacent thereto. This work was generally entered into with the greatest enthusiasm and effects were soon seen in improved conditions.

In the past stations for troops have been determined wholly by military necessity and it has not been possible to avoid unhealthy localities. Stations, too, have been in towns, where there have been any towns which could be occupied, both as towns were centers of insurgent activity and because of the shelter afforded, so necessary in a land of tropical sunshine and rain. Individual stations have varied greatly from a sanitary standpoint, the comparatively clean and well-built cities of Manila, Cebu, and Iloilo being infinitely better than

the nipa villages in the country or temporary camps in unpacified provinces.

All native towns are insanitary in many respects, but as affecting the health of soldiers the miserable methods in use for the disposal of excreta and garbage by their native neighbors are most important, as in other respects troops can be safeguarded by their own officers by providing them with good food, water, etc. In the larger cities garbage is now regularly collected for cremation or removal to a safe distance for burial, but foul cess pits still exist, even in the city of Manila, where the few so-called sewers are no more than porous drains.

Other factors which render towns unsuitable for occupation by soldiers are the close intimacy into which they are thrown with natives, with consequent danger from contagious diseases, including venereal affections and those diseases resulting from drinking bad water and eating contaminated native foods, and the ease with which vino can be procured.

Structures occupied by troops as barracks vary greatly, but are nearly all convents or private houses, only a few barracks having been constructed. Of buildings not specially erected, convents are much the best, and in some towns are very satisfactory. The greater number of structures are not so, and are gradually growing worse, as no money can be spent on buildings not belonging to the Government. Nipa buildings are not regarded as sanitary; nipa roofs harbor vermin, and split bamboo floors can not be cleaned, retaining all filth except that which drops through to soil the ground beneath. The life of even a small nipa building is short, and when size is increased sufficiently for barracks stability is much decreased.

Tents should be used in this country only as the most temporary emergency shelter; they are very hot in the dry season and unpleasantly and injuriously light, and in the wet season do not keep out the rain, and become mud holes under foot unless floored. Canvas, too, rots rapidly, and conditions, bad enough when tents are new, are decidedly worse after they have been in use a short time. Always a costly shelter here on account of the poor lasting qualities of canvas the expense of using them is enormously increased.

Station hospitals have been established in the same class of buildings as barracks, but old dwelling houses, while not desirable for barracks, are naturally worse for hospitals. Specially constructed station hospitals will be needed as well as barracks as soon as permanent stations are established. The pavilion plan should be adopted for those where size warrants such method of construction.

Drainage is entirely natural in the great majority of stations. The larger towns have open drains, some built of stone or brick, but no general system has been followed, and the fall is usually insufficient. Even in Manila the connection of stable drains and overflow pipes from cess pits, with insufficient flush and fall, makes them very insanitary. There are practically no sewers in the islands, the pervious brick or tile-closed drains in the city of Manila hardly meriting the name. The drains empty into the moat, the Pasig River, on the bay shore, or in a blind extremity. Some of the barracks are connected with them. The odorless excavator is used with general satisfaction, although if cess pits are properly constructed without overflow, with water-closets attached, they require very frequent emptying. The Smith Crematory was tried at Hospital No. 3, Manila, but was a failure, not only was

the odor almost unbearable in the closet building, but residents within a mile circle complained bitterly. Outside of Manila dry earth closets have proven satisfactory. Earth is often obtainable in small quantities only, but in those cases frequent cleansing has obviated that difficulty to a great extent. In Manila night soil is deposited at places designated by the board of health and at other stations is buried at a distance or thrown into streams or the sea.

This archipelago is one of the homes of foul water, the natives using the streams for drinking, washing of clothes and animals, bathing, and defecation. With very few exceptions no water should be drank before sterilization. The conformation of the country makes it probable that artesian wells would be successful, which is to be earnestly hoped, as by any system of sterilization occasional accidents occur, while nature's methods are sure. A good artesian well is now furnishing water at San Fernando, Pampanga, and another at the cold-storage and refrigerating plant, Manila, supplies a good water, but not in great quantity.

Chemical sterilization of water has hardly been attempted, all purification methods depending upon heat applied in different ways. A great deal of distilled water is furnished by Medical Department ice plants and by distilling plants belonging to the Quartermaster's Department, much water is boiled, and a considerable amount obtained from Forbes-Waterhouse sterilizers. There is much difference of opinion as to the value of the last-named method of sterilization, and there can be no question that the first statements made as to the absolute safety of this process were premature, the operation of these sterilizers requiring intelligent supervision, without which simple boiling is preferable.

The greater number of water-borne diseases in soldiers are now contracted on active field service, when so much water is demanded by free sweating, induced by exertion, and the great thirst is generally assuaged with any obtainable water; nor is it easy to boil sufficient water; and water thus sterilized remains hot for so long a time that it is difficult to make men drink it, demanding the greatest watchfulness on the part of officers. In the young and inexperienced soldier there is too often found a spirit of bravado which prompts him to drink any water, with the idea that to take precautions denotes physical weakness.

The clothing supplied has generally been of good quality and fairly well adapted to the climate, although much of the khaki fades, and in consequence bodies of men look badly.

For field uniform the present campaign hat is the most satisfactory head gear yet devised. The light-weight flannel shirt is also excellent, but should be made of khaki color, both as leading to decreased visibility and because the lighter color would be cooler. Khaki trousers are also good, but should be made loose around the hips and tight at the ankles. The present shoes furnished by the Quartermaster's Department are of good quality, but another style of shoe is needed of the high hunting-shoe type with tongue sewed on both sides, so as to be practically waterproof. Into this shoe the trousers should be tucked, the tongue and lacing being adjusted over them. Such shoes would be much better than leggings, which on muddy roads do not protect the legs and feet. That these shoes are practically useful has been demonstrated many times, officers who have worn them being

free from dhobie itch on the feet, while at the same time men wearing the present shoes and leggings were universally infected. The organism of dhobie itch is undoubtedly present in the mud, and in coming in contact with the almost unprotected feet of men is practically sure to set up the disease. The conditions of service is such that this shoe is required for cavalry as well as infantry. If drawers are provided, they should be loose and short, little more than trunks. The English do not use them in hot climates, and there is no uncleanliness in dispensing with them when the outer clothing is washable. The blouse is purposely omitted from this uniform. For station use clothing is needed which by its color and light weight will minimize the effects of high temperature. The material for this might be white cotton, but the blue checked cotton which the Spaniards employed is rather better, in that it is nearly as cool and does not soil so readily. A cap of the present shape, with removable covers of the same material, is recommended. The present chambray shirt is good, and the present styles of blouse and trousers, but all should be made on the same model and not, as at present, with differences in the number of pockets, etc. The collar of the blouse would preferably be a low standing one fastened with two removable buttons, as are officers' blouses, sufficiently snug not to require a white collar; all buttons and buckles should be removable in order that the garment will not be stained by rush in washing. White canvas shoes would be an excellent foot gear.

The method of carrying ammunition in a belt around the waist is an injurious one, especially here, where so large a proportion of marching commands suffers from diarrheal diseases. The method adopted by so many soldiers of their own volition of wearing the belt over one shoulder is preferable.

The habits of the men may generally be considered as good, although long distance from home and family and national ties tends to encourage a certain recklessness in behavior and a loss of fear of consequences. The lack of rational amusement and the inability to give vent to the natural activity of young men in athletic pursuits also have a bad effect.

Except when engaged in actual campaigning the greater part of a soldier's duties are performed in the cooler morning and evening, leaving the middle of the day free, which is as it should be. The deadly monotony of unoccupied hours can only be realized by one who has passed a season in a small Filipino town. Some organizations are fortunate in having libraries of their own; a good deal of much appreciated literature has been supplied by a society in Manila devoted to that work, and baseball is played by a small number of men. A few troops, too, are in stations where hunting and fishing are practiced during certain seasons of the year, but even in the best situations a good deal of time is left idle. This is consumed in associating with natives, often of the lowest class, to the benefit of neither soldier nor native. By removal of stations from towns some benefit may be expected, as already stated, but in addition, rational amusement should be furnished. To accomplish this the reestablishment of the post exchange is recommended in this division, with a room or rooms devoted to games, books, papers, billiards, when practicable, and other amusements. For the success of this plan it is thought that beer and light wines should be sold at a moderate price in a separate room in the same building.

The food received has been generally good, and the Subsistence

Department has widely extended around Manila the zone in which fresh meat and ice are supplied to troops. Remote stations in north Philippines and stations in the southern islands have not, however, been so fortunate, and in many of them the issue of fresh meat has been a rare occurrence. The Quartermaster's Department has recently secured a meat ship which will supply all coast stations and solve the problem for nearly all troops in the division.

Except for very few localities, all meat is now imported. This will have to continue for some years, as rinderpest has nearly destroyed the native cattle. In some posts the Medical Department has allowed the Subsistence Department to attach refrigerating rooms to ice machines, and in this way fresh meat has been kept which otherwise could not have been preserved for issue. Vegetables have also been furnished generously by the Subsistence Department, and there has been a scarcity only in those posts which from inaccessibility it has been impracticable to reach except at long intervals. The supply of ice to troops by the Subsistence Department has conduced much to their comfort and should be continued.

Continued experience tends to disprove belief in the advantages to be derived from a reduced ration lessened in the amount of nitrogen and fats. In the theoretical discussion of this subject claims are made that as food in the Tropics is not required for the maintenance of bodily heat, it might with advantage be reduced, especially in those foods which are heat producing. Other theorists have gone even further, even to the point of contending that rice being the staple food of natives, should be adopted to the exclusion of all else by the white man dwelling in the Tropics. Heat production must go on in the tropical countries as in temperate climates; in fact, a certain amount of heat production is essential as long as life lasts. The balance is maintained not by decrease in food, but by increasing heat loss by the use of lighter-weight clothing.

The main factor on which the amount of food needed depends is work. That a soldier's work in the Tropics is less than in a temperate climate is not true. The results accomplished may be less, but tissue is used up with much more rapidity in a mean temperature of 85° F. than at 50° F., and an ample supply of good food is required to supply this waste, the effects of deprivation being shown immediately in reduced strength and health.

PREVALENCE OF SPECIAL DISEASES.

SCARLET FEVER.

Among the mean strength of the Army, 92,491 men, during the year 1901 there were only 14 cases of this disease, none fatal. Eleven of the cases occurred among troops stationed in the United States, 2 among those in garrison in Cuba, and 1 in the mean strength of 59,526 men operating in the Division of the Philippines. After the close of the calendar year a case was discovered on the transport *Meade* on the day following her departure from San Francisco, Cal., with troops for Manila, P. I.

MEASLES.

In the Army as a whole 769 cases were reported during the year 1901, with 12 deaths and 5 discharges from resulting disability. The

cases were equivalent to 8.31 patients in every thousand men of the mean strength. Four hundred and seventeen of the cases were developed in the United States, equivalent to 15.73 per thousand of the strength present, and 9 of these cases proved fatal. The 3 other fatal cases occurred among 351 cases reported from the Philippines. One case, not fatal, occurred in Cuba and none in Porto Rico.

On January 26, 1902, a case of measles developed in a recruit recently arrived at Fort Sheridan, Ill., for the Twenty-ninth Infantry. Several other cases from the same source, Columbus Barracks, Ohio, appeared almost simultaneously. Although the usual precautions were observed to limit the spread of the disease, many members of the command were contaminated and every organization but one was represented among the infected.

As the probable extent of the outbreak was unknown and the regiment was on the eve of departure on a railway journey across the continent of from four to five days' duration, Maj. Frank J. Ives, surgeon, U. S. Army, recommended that to each train a tourist sleeper be attached to be used for hospital purposes. This was favorably considered by the commanding general of the Department, and the extra coaches were attached as recommended. This arrangement proved extremely satisfactory. An inspection by the medical officer of each train was made twice daily of the entire command, and all suspicious cases at once separated. About 10 cases of measles developed, 1 of them a child of an officer. All of these were promptly isolated, and, as subsequently demonstrated by the small number of cases occurring prior to the departure of the regiment for the Philippines, the infection as far as the trains were concerned was limited to a minimum.

As the sections ran closely together, it was deemed advisable as far possible to keep one of the hospital cars free from infection. This was accomplished by transferring all cases of measles as soon as diagnosed from the first to the second section. As the latter pulled into a station a few minutes behind the former the transfer was easily accomplished, and the hospital car attached to the first section was kept entirely free from infection.

Where reasonably large bodies of troops travel by rail for a period of over two days the medical service is greatly enhanced and the comfort and welfare of the sick immeasurably improved by the addition of such a hospital car to each train.

Measles appeared at the Presidio, San Francisco, Cal., about the middle of December, 1901, the first case being admitted to the general hospital at that place on the 17th of the month. During the rest of the month 8 other cases were received. The epidemic spread with considerable rapidity, 73 cases being admitted in January, 1902, 79 in February, and 116 in March. During April there was a falling off to 82, and a further decrease in May to 24. By June 1 the epidemic was practically at an end.

Previous to March 21 these cases were treated in two large buildings which had served as barracks. Each of these buildings contained 1 large and 2 small squad rooms, accommodating 35, 12, and 8 beds, respectively.

In time these rooms became much overcrowded, owing to the rapid extension of the epidemic and to the adoption of the rule requiring patients to remain under surveillance in hospital until thirty days after the onset of the disease. It was found necessary to make this rule

because of the susceptibility of these patients to broncho-pneumonia, especially when subjected to the exposures incidental to camp life in this locality.

The difficulty of treating the men was also increased by the fact that many of them were recruits who had not yet learned the essentials of personal cleanliness and care of the squad room. According to a report by Col. A. C. Girard, in command of this hospital, the nursing of patients was acceptably performed by members of the Hospital Corps until February 13, 1902, when it become possible to give the care of the sick into the hands of trained female nurses. There was thereafter a marked improvement noticeable in the care and management of the wards, comfort of the patients, and discipline of the men. Under the charge of Hospital Corps men it seemed impossible to prevent the untrained patients from expectorating freely upon the floor, a practice which was followed by a surprisingly large number of lung and ear complications. To show the probability of infection from this source it is interesting to note that no case of broncho-pneumonia and very few ear complications arose in the wards which were disinfected and placed under the charge of female nurses.

On March 21, 1902, the improvised hospital at the barracks was abandoned, and the wards in the general hospital proper were turned over for the care of the patients with measles. Their proximity to the general wards proved of no moment, as no case developed through conveyance of the contagion.

Eighteen deaths occurred, all among 28 patients who developed broncho-pneumonia. The fatal cases were characterized by great intensity of symptoms from the onset of the complication, showing a high degree of toxæmia, 4 cases dying in five days, and 9 in eight days or less. In nearly all the fatal cases there was more or less pleuritic effusion, which inevitably became purulent.

Those cases which went on to recovery never showed any extensive involvement of the lungs, but convalescence was protracted.

	Number.	Per cent.
Total measles treated	381	
Total cases pneumonia	28	7.3
Total deaths	18	
Measle cases		4.7
Pneumonia cases		64.3
Total cases suppurative middle ear	46	12
Total cases suppurative mastoiditis	7	

In cases which were autopsied sections were taken of the organs, and examination by the pathologist of these sections showed enormous numbers of streptococci in the tissues, especially in the sections of the lung and spleen. Specimens of the sputa stained showed a preponderance of streptococci, there being comparatively few pneumococci present. From the examination of the sections and the sputa the conclusion is unavoidable that these cases became infected with streptococcus septicæmia. Cultures from the sputa and from the diseased organs in a few cases showed a typical streptococcus, and as far as observations have gone this organism did not differ from the ordinary streptococcus pyogenes.

MUMPS.

This disease furnished 1,382 cases, equivalent to 14.94 cases per thousand of strength, but no fatality was recorded. The admission rate in the United States was 23.23 per thousand of strength, due to 616 cases in the mean strength of 26,515 men. In the Pacific islands the admission rate was 12.40, due to 748 cases in the mean strength of 59,526, serving in the far East. From Cuba a total of 10 cases and from Porto Rico 18 cases were reported.

SMALLPOX.

In the Army as a whole 125 cases, equivalent to 1.35 cases per thousand of strength, were reported during the year. Thirty-seven of these cases were fatal. Forty of the cases occurred in the United States, equivalent to 1.51 of the strength serving on the home stations, but none of these cases were fatal. Eighty-five of the cases, equivalent to 1.43 of the strength, occurred in the Philippines, and among these was recorded the total mortality of the Army, 37 cases, from this disease. No case of smallpox was reported from either Cuba or Porto Rico.

To promote efficiency in the vaccination of recruits, the following circular was issued from the Adjutant-General's Office October 7, 1901, giving directions to be observed by medical examiners in performing this operation:

1. Sterilize the area to be vaccinated—usually the outer aspect of the left arm at or near the insertion of the deltoid—by thoroughly scrubbing with soap and water, using a scrub brush and following with alcohol. The skin should be permitted to dry by evaporation.
2. Scarify the arm within the sterile area at three points not less than an inch from one another. This should be done with a sterile needle or lancet by making several fine parallel scratches and cross scratches. These should be only deep enough to slightly redden the surface.
3. Apply the lymph from tube or point, spread it over the scarified surface with a suitable sterile instrument, allow to dry, and then cover with sterile protective dressing.

Capt. Charles E. B. Flagg, assistant surgeon, U. S. Army, Fort Grant, Ariz., has reported his experience with the hypodermic method of vaccination. He has used it since July, 1899, and believes that infection by this method is less likely to occur than by abrasion. His report, dated February, 1902, is as follows:

"The preparatory technic and after treatment are, in the main, the same as I have always employed. The arm or part to be vaccinated is scrubbed with a brush with green soap and boiled water, then with a 1 to 4,000 bichloride of mercury solution and washed with alcohol or boiled water. In garrison, or when this preparation is done by myself, and I am sure of asepsis; the bichloride solution is omitted and the arm scrubbed only with alcohol after the soap.

When a number are to be vaccinated at one time a reliable Hospital Corps man does this preparation. His hands are prepared as for an abdominal section, and he wears freshly boiled rubber gloves when they are available. Two or more brushes are alternately used, and the one not in use is kept in boiling water on a coal-oil or other stove. The scrubber is careful not to "dip back" from dirty arms to sterile water; he also avoids catching hold of arm or otherwise contaminating his hands. The man to be vaccinated, after being scrubbed and cautioned to keep his hands off the area, passes to the alcohol or bichloride solution and sterile-water stand, where sterile hands scrub the part with a piece of sterile gauze wet with the solution. One piece of gauze is used for each man. The man is now ready for vaccination. A tube of

glycerinated virus is cut with sterile scissors and the contents distributed at four points about 2 cm. apart. The sterile needle of a hypodermic syringe is then inserted through each drop separately, into the skin—not underneath—and pushed along nearly parallel with the surface until the hole at the end of the needle is well out of sight. After each case is vaccinated the syringe, which has previously been filled with sterile water, is emptied of a few drops to clean the needle and placed with the needle suspended in boiling water. A retort stand, ring, clip, and alcohol lamp are used for this purpose, and when these are not available a tin can with a hole in the top small enough to prevent the guards of the syringe from passing through is used. Two or more syringes are used to avoid wasting time. Sterilization by passing the needle through the flame has been recommended. The sterilization is efficient, but the needle will not stand it. The temper is taken out of the needle and it bends. As soon as each case is vaccinated an assistant applies a sterile pad of several thicknesses of gauze and keeps it in place over the wound by two strips of adhesive plaster around the arm over the gauze, above and below, not directly over wound.

The man is instructed to keep this dressing dry and in place, and to report at once if the dressing gets wet or becomes displaced. He reports in five days for inspection of the arm. Recruits are faced to the rear in line, as in this formation they do not see what is being done to other men and are not so apt to faint as when they see what is going on.

The time consumed by this method is insignificant, and much time and labor is saved by the few redressings required. I believe field service is no excuse for failure to apply aseptic technic to this operation. The Seventeenth Infantry was vaccinated at Tarlac, P. I., November 17, 1899, during active operations and soon after we arrived, by two acting assistant surgeons and myself in this cleanly manner.

I have record of 320 cases vaccinated since August, 1899, and histories of 3 cases of vaccinia during that time. One of these cases lost one day of duty, 1 three, and 1 five; total of nine days lost. The hypodermic method seems to me to possess certain advantages over the abrasion method, but I believe that there would be little trouble after any method if properly done. Vaccination should be considered a surgical operation, not a medical procedure to be done by people not familiar with aseptic technic.

INFECTIOUS DISEASES ON TRANSPORTS.

Although the infections of scarlet fever, mumps, and measles were quite prevalent and that of smallpox not infrequent in the United States during the year, it is gratifying to record that few of the transports carrying troops from San Francisco, Cal., to Manila became infected. Great care was taken in the examination of troops before embarkation, but nevertheless cases of disease were occasionally embarked. The transport *Kilpatrick* was the most unfortunate of these vessels. On her voyage from San Francisco, Cal., to Manila, April 5 to May 12, 1901, she had 3 cases of variola, 32 of mumps, and 31 of measles, and on her corresponding voyage January 16 to February 17, 1902, she had 7 cases of mumps and 40 of measles. On the transport *Meade*, which sailed from San Francisco, Cal., March 2, 1902, there was discovered on the following morning a case of scarlet fever, with exudation in the throat, and a case of smallpox fully developed. The vessel put back into port and went into quarantine for disinfection. In the case of the *Kilpatrick* the chief surgeon of the Department of California reported that in his opinion it was practically impossible to prevent the occurrence of minor eruptive diseases among the recruits en route to the Philippines. All reasonable precautions were taken and the system of inspection prior to embarkation was rigid. In addition to those mentioned, the *Sheridan* arrived at Manila, P. I., January 26, 1902, with 23 cases of measles; the *Thomas* March 3, with 48 cases; the *Grant* March 12, with 7 cases; the *Warren* April 2, with 31 cases of measles and 9 cases of mumps; the *Hancock* April 12, with 2 cases of mumps. On the *Sheridan*,

which arrived May 1, 1 case of smallpox occurred before reaching Honolulu, H. I., and was transferred to the quarantine station at that port. There was no spread of the infection from this case.

INFLUENZA.

Of this disease 2,608 cases were reported from the Army, equivalent to 28.20 cases per thousand of strength. Only 1 of these cases was fatal. Most of the cases, total number 2,295, equaling 86.56 per thousand of the strength, occurred in the United States.

DENGUE.

Dengue, on the contrary, was almost absent from the United States, Cuba, and Porto Rico, but quite prevalent in the Philippines, giving 31.67 cases per thousand of strength in the division.

DIPHTHERIA.

This disease was not prevalent in the Army during the year. The total number of cases was 27, 2 of which were fatal. Sixteen of the cases occurred in the Unitad States, and 11, with the 2 fatal cases, in the Philippines. No case occurred in Cuba or Porto Rico.

YELLOW FEVER.

In the Army as a whole only 14 cases, 1 of which was fatal, were reported during the year. All of these occurred in Cuba prior to the precautionary measures taken in consonance with the important discovery made by Maj. Walter Reed, surgeon, U. S. Army, and his associates, concerning the propagation of the disease by the bites of infected mosquitoes. Since prophylactic measures based on Major Reed's discovery have been instituted no case of this dread disease has been reported from the army in Cuba, and the reports from the civilian population have been equally satisfactory. The importance of Major Reed's work can not be overestimated. He has shown how the human race may be freed from the scourge of yellow fever as Jenner showed how it might be freed from the deadly ravages of smallpox.

At the Pan-American Sanitary Congress held in the city of Habana, Cuba, February 15 to 20, 1902, the Army Medical Department was represented by Lieut. Col. Valery Havard, deputy surgeon-general, Maj. William C. Gorgas, and Maj. J. R. Kean, surgeons, U. S. Army.

The American republics represented by duly accredited delegates were the United States (delegates from the Army and the Marine-Hospital Service), Cuba, Mexico, Argentina, Colombia, Costa Rica, Santo Domingo, Ecuador, Nicaragua, Paraguay, and Uruguay. Besides the official delegates, the congress was also attended by many of the best representatives of the profession in Cuba, as well as by several architects and sanitary engineers.

The papers read and discussed during the sessions covered a large field of interesting and fruitful subjects and testified to the earnestness and thoroughness with which, in spite of many difficulties, the work of the congress was organized and carried out by the executive committee.

The most interesting and important session was doubtless that of February 19, devoted to the history of yellow fever and especially the recent discoveries concerning the nature and mode of transmission of the disease. It soon appeared that the experiments carried out by Major Reed's commission and subsequently by other distinguished physicians in the city of Habana, were known to all the delegates and that the inevitable conclusions would be accepted. Colonel Havard, after his paper on the transmission and prevention of yellow fever had been read and discussed, presented in open session, so that all present—delegates and others—might vote upon it, a resolution on the mosquito as causative agent of yellow fever. All voted in the affirmative with only two exceptions—two negative votes cast by physicians (not delegates) of obscure standing in the community. The resolution was as follows:

Accepting as an established fact that the mosquito (*Stegomyia fasciata*) so far as known is the only agent capable of transmitting yellow fever, and that consequently the prophylaxis should consist in the destruction so far as possible of the mosquitoes of that species and the use of the most effective means to prevent their access to yellow-fever patients.

In the evening of that day the delegates met to consider the official resolutions prepared by an especial committee. The resolution just cited having been adopted without a dissenting voice, a motion was made to add to it a clause embodying the practical deduction naturally flowing from it, namely, that quarantine regulations in their application to yellow-fever cases should be based upon the doctrine which it enunciates. This motion was combated by the delegates from the United States Marine-Hospital Service as well as by Dr. Porter, secretary of the Florida board of health, and lost, a result as illogical as it was unexpected.

TYPHOID FEVER.

Of this disease 594 cases were reported during the year, with 78 deaths and 5 discharges for disability. The cases were equivalent to 6.42 and the deaths to 0.84 per thousand of the strength of the Army. The admission rate for this disease in the United States, 9.43, was higher than in the Philippines, where it was 5.29 per thousand men, and in Cuba, where it was only 3.21. In Porto Rico it was 10.41. During the decade 1890–1899 the mean annual rates of admission and death per thousand of strength were respectively 20.49 and 2.29, but these rates are excessively high, as they include the great prevalence of the disease in the camps of the Spanish-American war in 1898. Going back to the decade 1888–1897 we find the mean annual admission rate 4.95 and the death rate 0.55 per thousand of strength. During the past year, therefore, the disease was considerably more prevalent than during the years of peace prior to 1898.

It is probable that the records give an underestimate of the number of cases of typhoid, as 1,805 cases of fever, equivalent to 19.52 cases per thousand men, were reported as undetermined. None of these undetermined cases proved fatal. In the Philippines the rate of admission was 25.38 per thousand men, and in the United States 8.22, the higher rate in the Pacific islands being probably due to a want of facilities for making use of the Widal reaction.

An epidemic of typhoid fever occurred at Fort Clark, Tex., October 1 to December 20, 1901, and was reported by Capt. T. S. Bratton,

assistant surgeon, U. S. Army. On reporting for duty at this post October 1, 1901, Captain Bratton found on sick report 7 cases in various stages of a continued fever, which had been recorded as continued malarial fever. On October 2 three other cases entered the hospital, and next day a fourth case. These cases he regarded from the clinical records as all cases of typhoid fever. In the absence of means to detect the plasmodium, the administration of quinine in large doses was relied on to differentiate. All the suspected cases gave negative results with large doses, but gave positive reactions with the Widal test when samples of blood were sent to the Army Medical Museum for examination. Dr. Bratton continues:

It was reported, and the register confirmed it, that this epidemic of continued fever has existed all summer with more or less intensity, which gradually increased as the fall advanced.

On looking for a cause it was found, first, that the water supply was excellent, being obtained from a large spring 50 feet in diameter and 17 feet deep in the center and supplying at least 8,000 gallons per minute. The intake pipe was in the center of the spring and 10 feet under the surface. It would be impossible to contaminate this spring for any length of time on account of its large flow. However, the troops were afraid of it and were using distilled water from the ice plant for drinking purposes.

Next the sinks were examined. They consisted of earth closets, the contents being removed nightly. Some deposits were covered, many not at all, and others imperfectly so. The urinal consisted of a trough that ran into a tub without cover. This tub was also emptied every night.

The usual number of flies were found around these sinks, but it was in the kitchens and dining rooms of the barracks that they actually swarmed over everything. The kitchens and dining rooms were furnished with screens, but these were badly fitted and full of holes in many places; in fact, worn out.

No case of fever had occurred among the officers nor their servants, and no case, so far as I could learn, had occurred in the town of Brackettsville, though the people were using the water obtained from the stream about a hundred yards below the spring, this being hauled to them in barrels. It was believed that the disease was originally brought to the post by recruits, as part of the Twelfth Cavalry was organized here during the summer. With these facts at hand, a special sanitary report was sent to the adjutant. * * *

An examination of the spring shows that the fence inclosing it is inadequate and in several places broken down, thus allowing cattle and other animals to enter the inclosure and defile the watershed, if not the spring. The margins are overgrown with water lilies, which in themselves are not harmful, except that they allow trash and detritus to collect on the surface of the water and prevent proper drainage at the outlet, where they are especially luxuriant. It is recommended:

1. That the fence be extended so as to exclude cattle from all portions of the spring and that the broken portions be repaired.

2. That the watershed be thoroughly and frequently cleaned, and that neither man nor beast be allowed within the inclosed shed.

3. That the lilies around the margin, and especially at the outlet, be cleaned away so as to allow free drainage of the spring water and the surface accumulations.

4. That the tanks in the water tower be cleaned at frequent intervals. With the above procedures carried out, I can not believe that distilled water is either necessary or advisable at this post. The spring is a large one and of great volume, and with the infrequent rain prevailing here should not become contaminated by surface drainage. Theoretically distilled water is quite pure, but practically much distilled water is quite impure when it reaches the consumer.

An inspection made at 2 p. m. to-day, October 6, 1901, of the dining rooms, kitchens, and earth closets, shows that they are all swarming with flies. The screen doors and windows are badly fitted and broken, and one troop (C) has no window screens at all to the dining room and kitchen. The dry-earth closets are about 30 yards from the kitchens and dining rooms, and here flies are again in swarms. The majority of fecal deposits were not covered, or only partially so. The experience of the summer of 1898 in the different camps makes it plain that this is the greatest source of infection, for the conditions are analogous. It is recommended:

1. That the dining rooms and kitchens be properly screened at once and every precaution taken by company cooks and dining-room men to keep the flies out and away from the food.

2. That instead of using the dry-earth closet the troughs be filled with a solution of lime to the depth of 4 inches, and that the present urinal be done away with and the men made to pass their urine into the lime solution in the troughs.

3. That these troughs be emptied daily. It is further recommended that the odorless excavating tank wagon with detachable pump be obtained to facilitate the daily removal of trough contents.

The above recommendations in regard to the latrines are the best practicable that can be carried out at once, but should be used only during the time necessary for the Quartermaster's Department to place a well-constructed water-closet and sewer system in the post. * * *

As part of the odorless extraction apparatus was missent and did not reach this post till some time in January, 1902, it was not till cold weather killed the flies that the disease stopped. The middle of December, 1901, the weather was quite cold for two or three days, averaging 18 degrees, and the last case of typhoid entered the hospital December 20, 1901.

From October 1 to December 20, 1901, there were treated 33 undoubted and well-marked cases of typhoid fever, with 5 deaths, a mortality of 15.1 per cent. This rather high mortality can only be accounted for by the fact that many of the cases came to sick call, recruit like, only after they had been sick a week or ten days. Two of the worst cases came in from a ten days' practice march. The following table shows the number of cases in each organization:

Troop A, Twelfth Cavalry	6
Troop B, Twelfth Cavalry	6
Troop C, Twelfth Cavalry	5
Troop F, Twelfth Cavalry	9
Twelfth Company, Coast Artillery	2
One hundred and twenty-fifth Company, Coast Artillery	2
Detachment Hospital Corps	1
Prisoners	2
Total	33

No case has occurred since December 20, 1901, up to the present time, March 24, 1902, with one exception, and he came to the post sick from a month's furlough; consequently not considered a case originating at Fort Clark.

Three of the fatal cases died of exhaustion, their systems not being able to hold out longer against the typhoid intoxication, notwithstanding great stimulation with whisky and strychnine. Two died of intestinal perforation and its consequences. One case developed orchitis of the right testicle during convalescence. The testicle suppurated and was enucleated. Three cases suffered with swollen lower extremities (phlebitis) during the latter part of the disease and convalescence. Epistaxis occurred in 8 cases during the disease. One case developed a lobar pneumonia during the height of the disease, but recovered from the pneumonia, and about ten days later passed through the critical stage of the typhoid fever and recovered. This case was one of the three of phlebitis mentioned above. The phlebitis of the left leg began during convalescence.

Purulent otitis media of both ears, with perforation, occurred in one case. This case was particularly severe in its infection. The patient came to the hospital at 10 o'clock in the morning. He said he did not know what was the matter, but that he felt so weak he could not get on his horse to drill. Temperature and pulse were normal, but the man had a distressed expression, and his hands were cold and blue. His tongue was coated white, but he had no pain in the abdomen. He was placed in bed, where he went to sleep almost at once. At 6 p. m. his temperature was 105° F., and at this time he complained of considerable pain in his chest and cough. This pain and cough were due to a slight bronchitis. He was given Dover's powder and phenacetine. The next two days quinine in large doses was given without any effect whatever on the temperature. The case was then considered one of typhoid fever and put on the cold-bath treatment. This did well till about the fifteenth day of the treatment, when it was found that he did not react well. His skin would stay cold and blue from one bath till the temperature indicated another, notwithstanding whisky was given after each bath. The baths were stopped and whisky and strychnine were given instead, and the amount of whisky and strychnine this patient took with greatest benefit, which was quite perceptible, was something astonishing. For ten days he took 30 cubic centimeters of brandy every two hours, night and day, with 2 milligrams of strychnine every three hours.

The majority of the cases on entering the hospital complained of pain in the chest and had a slight cough—a slight bronchitis. This is interesting, since several writers insist that the lungs are the seat of initial infection.

One case developed abdominal ascites after the patient had been to duty several weeks, and also showed albumen and hyaline and granular casts in his urine. Under proper treatment the albumen and casts disappeared. The ascites also disappeared, but the liver, however, was found hypertrophied.

One case gave marked symptoms of cholecystitis during the height of the disease.

It was noticed that those cases that had diarrhœa did badly; in fact, two of them died, and, on the contrary, those that were more or less constipated did well.

Early in July, 1902, on account of the reported prevalence of typhoid fever at Camp Thomas, Ga., a board consisting of Maj. Jefferson R. Kean, surgeon, U. S. Army, and Contract Surgeon James Carroll, U. S. Army, was appointed to make a thorough sanitary inspection of the camp and submit a report to the Adjutant-General of the Army, through the Surgeon-General. Major Kean was directed also to make such suggestions and recommendations to the commanding officer of the camp and the medical officers on duty thereat as seemed to him in the best interests of the service to maintain the health of the troops and eradicate epidemic disease. Action was promptly taken on this order, as shown by the report of the board:

We have the honor to make the following report on the sanitary inspection of Camp George H. Thomas, at Chickamauga Park, ordered in paragraph 21, Special Orders No. 158, current series.

In accordance with that order we proceeded to Chickamauga Park on July 10, arriving on the morning of the 11th, and at once proceeded to investigate the origin of the cases of typhoid fever which have occurred at that camp.

The hospital register was first carefully examined and all cases of diarrhœa or fever of any sort lasting more than five days were picked out for special scrutiny. In these cases the medical history and record of temperatures were carefully gone over in each case, and cases considered at all suspicious tested by the Widal reaction.

It was thus established that only seven cases of typhoid fever had occurred in the command since its arrival at the camp from Cuba on May 25. These cases were as follows:

Name.	Grade.	Troop.	Organization.	Years of service.	Date of admission.
Storm, Harry	Private	F	Seventh Cavalry	1½	June 4
Harris, John C	Corporal	B	do	2½	June 20
Brown, Charles A	Private	I	do	1½	Do.
LeClair, Arthur	do	F	do	1½	June 28
Allen, Lawrence F	do	Band	do	2½	June 2
Chapman, Ira	do	M	do	*18	July 6
Grimme, Louis B	do	B	do	1½	July 7

* Days.

Of these patients, Corporal Harris died on July 8, prior to our arrival at Chickamauga. The diagnosis in this case was confirmed by autopsy. Private Storm was suffering with a relapse, due to having surreptitiously obtained solid food. Brown and LeClair were convalescent. In the cases of Allen, Chapman, and Grimme, the disease was well marked, but not severe, and the diagnoses were confirmed during our stay with the Widal test.

The number of cases which had occurred in the command having been thus accurately determined, a careful inquiry was made in the case of each patient to determine, if possible, the origin of the infection. The length of residence in the camp, habits as to visiting Chattanooga, Rossville, and the surrounding country houses, as to drinking milk and spirituous liquors, and the source of the supply of drinking water of the organization to which each patient belonged during his period of incubation were carefully investigated. A careful investigation was also made of the water supply and milk supply of the camp, the sanitary condition of houses occupied by employees in the vicinity of the camp, the method of disposal of wastes, the measures taken for protection against flies, the general police of the camp, and the distribution of typhoid fever in the surrounding country.

As this command had had no case of typhoid fever in it for several months prior to its departure from Cuba on May 20, and as the first case occurred sixteen days after that date, it is evident that the regiment did not bring any infection with it

from Cuba. Troop F, to which the first case (Private Storm) belonged, arrived at Camp Thomas on May 25, eleven days prior to his admission to hospital, and it is possible that he acquired the infection en route from Newport News, where the command landed, to Fort Thomas. This, however, seems unlikely, as the men were kept closely together en route, and any source of infection to which one was exposed would have been probably shared by a large number. This, together with the fact that more than the average period of incubation had been passed at the camp before he was taken sick, makes it probable, although not certain, that the infection was acquired after the arrival of the command in camp.

Storm visited Chattanooga, Rossville, and various places in and about the park during the period of incubation, and about May 29 was in Rossville and took some refreshments there. He stated that he did not use ixtoxicating liquors at all. The sanitary condition of Rossville being bad, and typhoid fever existing there as shown below, it seems quite probable that this first case was acquired at that place.

An examination of the six succeeding cases shows that they occurred in two groups, three occurring between June 20 and 23 and three between July 2 and 7, inclusive. In neither of these groups could anything be elicted which showed a common source of origin. As seen by the appended map of the camp, they were widely scattered. They had different sources of milk supply. The sources of drinking water of the organizations to which they belonged was the same as that of other organizations in which typhoid fever did not occur, and the number of cases is so small in proportion to the number exposed that it seems improbable that infection should have come from the water supply of the camp.

Suspicion is diverted from the milk supply also by the fact that Brown, Allen, and Grimme do not like milk and do not drink it, while Chapman stated that he only drank one glass of milk during his period of incubation. This glass was taken at the post exchange, the milk supply of which was investigated and found to be above suspicion.

With regard to the milk supply, the following table shows the organizations with their milk supply, and the occurrence of typhoid, with date, in each organization:

Troop.	Cases.	Milk supply.
C		Conley.
B	June 20, July 7	Shields.
D		Do.
A		Blaylock.
H		Shields.
F	June 6, June 23	Horton.
E		Do.
G		None purchased.
I	June 20	Do.
K		Do.
L		Conley.
M	July 6	Do.
Band	July 2	Bolt.
Third Battery		None purchased.

An examination of this table makes it clear that an infected milk supply could not be the cause of any considerable proportion of these cases. The board spent much time in visiting the various milkmen and did not find that a case of typhoid had occurred in the family of any one of them during the present year, while the arrangements for caring for the milk and cleaning the utensils were fully up to the standard which is customary in farmhouses. It was found that, as a rule, on account of the absence of ice, the milk was brought to the camp immediately after the morning or evening milking.

In the above table the organizations are arranged in the order of their respective positions in the camp from south to north.

Camp George H. Thomas is occupied by a full regiment of cavalry—the Seventh—with the Third Light Battery of Artillery and a detachment of about 25 Hospital Corps men. The strength of the command is approximately 1,100 officers and men, with an equal number of horses.

Camp Thomas is carefully laid out, and during the time of our visit was kept in an admirable state of police. The men occupied framed hospital tents, 14 being assigned to each troop for its occupation. The average number of occupants to a tent is 5. The only criticism which seemed possible to bring against the camp was that the men's tents were too closely crowded together in order to enable adjoining tents to

use the same side rails, no space being allowed between the tents so as to admit of a lateral shifting of them from time to time to permit the ground under them to be cleaned and sunned. As, however, it would be quite a troublesome task to move framed tents, it is probable that this would not be done even if space permitted. The tent floors are raised a foot to 18 inches above the ground to admit of ventilation beneath them.

The mess halls and kitchens, bath houses and latrines are simply frame buildings, the mess halls and kitchens being screened to exclude flies. The screening is, however, entirely insufficient, because the flies find ready access through cracks in the floors and walls of the buildings and through the open space under the eaves. This defect, however, could be remedied without any great expenditure of money and trouble.

The latrines are a rude imitation of the camp latrines described and adopted in General Orders, No. 170, Adjutant-General's Office, 1899. These troughs connect with the camp sewer, an 8-inch tile pipe discharging into Chickamauga Creek. They are flushed from four to five times a day by a man detailed for that purpose. Although ill made and uncomfortable, these latrines are perfectly satisfactory from a sanitary standpoint. Very few flies were seen in or about them, and it was not found necessary to use lime in connection with them, except for the urinals. The installation of this latrine and sewer, together with an efficient screening of the mess rooms and kitchens, would make it impossible for typhoid fever to be disseminated in this camp by the agency of flies.

WATER SUPPLY.

When first constructed, the water supply of the camp was by a 2-inch pipe from the pumping station on Chickamauga Creek, this pipe having some thirteen 2-inch vents and between forty and fifty 1-inch vents in the camp. This system, of course, failed to supply a sufficient flow of water and was replaced by a 6-inch main, laid by the commanding officer, with the labor of troops, from pipe which had been used in the park in the camp of 1898. This main gives an abundant supply.

The Chickamauga Creek water was, during the entire period of our visit, very muddy and unattractive looking. A bacteriological examination showed that it was unsafe as well as unattractive, the number of bacteria per cubic centimeter being 24,000. The limit to the number of bacteria in potable water is usually given as 500. While this water was used for bathing, sprinkling, watering horses, etc., its unattractive appearance prevented its use to any great extent for drinking purposes, the supply for these purposes being hauled from the Blacker well, just south of the camp. The Third Squadron also drew its supply of drinking water, in some instances, at first from the well on the west side of the Lafayette road, east of the north end of the camp. These wells were among those bored by the Park Commission during the summer of 1898. The Blacker well is 75 feet deep, the other being 78 feet, and each being 6 inches in diameter. Except the first 5 or 10 feet, which is through earth and gravel, the boring is through solid rock, and we were informed by Gen. H. V. Boynton, of the Park Commission, that no pockets or holes were found in this rock, and no water came into the boring until the permanent supply was reached, when the water rose, in each case, nearly to the surface of the ground. The upper section of the well, down to the solid rock, is protected by an iron casing, which is driven firmly into the rock and made tight by a course of cement at the juncture. The upper end passes through a large slab of stone, to which the pump is attached, so that there seems to be no possibility of contamination of these wells from surface drainage.

The bacteriological analysis of the Blacker well showed the water to be very pure, the count being 5 bacteria to the cubic centimeter. For some reason unknown to the board, the other well did not make as good a showing, the number of bacteria being 344 to the cubic centimeter.

An important step to secure the command against the use of undesirable waters for drinking purposes was made about July 10, when, by orders of the commanding officer, each organization was supplied with a large water barrel, in which pure iced water should be kept conveniently at hand. The pure water is thus made much cooler, more potable, and more convenient to procure than any other. The drinking of the Chickamauga water, unless previously sterilized, was at the same time forbidden.

Four sterilizers of the Forbes-Waterhouse pattern were issued to the troops by the Quartermaster's Department on June 27, but these did not come into habitual use until July 7 or 8, and the number was insufficient for the command. After a considerable correspondence, six additional sterilizers have been secured, and existing camp orders require that all drinking water be passed through them. In the corre-

spondence relating to these filters the position was taken by the Quartermaster's Department that neither the hospital nor the post exchange should be supplied by that department. As the object of furnishing this apparatus is to preserve the health of the command, it would seem that it should be furnished wherever a supply of drinking water is needed by the command in order to secure that object. A single source of contaminating water will readily produce an epidemic, and if the use of sterilizers is necessary in the command, it would much facilitate promptness of introduction to have them all furnished by a single department.

In the immediate vicinity of the camp, and surrounding it on every side, are six houses occupied by park employees. Most of these houses also shelter the families of officers or soldiers as boarders. One of these houses had no privy at all, the surrounding woods being used by its occupants. The others had all open privies, with a shallow open ditch for the reception of fecal matter. In several cases the fecal matter was above the level of the ground, and in every case it was offensive, and flies were abundant. It is evident that for the security of the camp properly constructed privies should be provided for each house, having a dark, tightly closed pit and covers to the holes that close by gravity when not in use. The sanitary conditions or these dwellings should be under proper inspection and regulation by the military authorities during the occupation of the camp. It is believed that this can be readily arranged by agreement between the Park Commission and the military authorities. But, to prevent delay and secure a suitable and uniform pattern in each case, the privies should be rebuilt or put in order by the Quartermaster's Department, the commanding officer of the camp being furnished with money for that purpose. A very small amount of money, if promptly given, will secure the command against danger from this source.

At present, as we were informed, the commanding officer has not lumber nor any allowance of money for this purpose, or to complete the screening of the mess rooms and kitchens, or for any similar sanitary purpose, however necessary.

The house, which had no privy, was within 250 yards of the hospital, while of the other five houses mentioned two were within the limits of the camp and three immediately adjacent thereto.

In considering the source of the typhoid infection at Camp Thomas, the question came up for consideration whether it were possible that the soil infection existing at Chickamauga Park in 1898 could continue to exist and propagate itself in the soil for four years. This is a very interesting and important question, and one on which there is very little literature, so far as is known to the board.

In the report of the typhoid commission, of which Maj. Walter Reed was president, which investigated the typhoid in the volunteer camps in 1898, the experiments of Robertson are mentioned, in which the typhoid organism was found in soil which had been enriched by the application of bouillon for a year after it had been planted there. The fact is also established that the bacillus of Eberth disappears from the upper layers of the soil during the winter and reappears during warm weather, propagating upward. Earth was taken by Dr. Carroll from a depth of 6 inches below the surface of a number of the sinks used in 1898 by regiments that were infected with typhoid. As the investigation of these specimens of soil will take some weeks, it will not be practicable to embody the results of his investigation in this report.

The locality of Camp Thomas was occupied in 1898 in part by the Third Cavalry, which had no cases of typhoid during its stay at the park, and in part by the First Mississippi Volunteers as their third camp. This regiment was severely infected, having furnished 397 cases with 29 deaths during its stay at the park. The length of time which it remained on this camp site is not known to the board, but it is certain that some soil infection must have been caused by it at that time.

As a precaution against soil pollution and possible soil infection, the board in its recommendations to the commanding officer of the camp strongly advised the use of urine tubs in company streets at night. The inclination of men who have occasion to urinate during the night to do so in the neighborhood of their tents when in camp instead of walking a considerable distance to the latrines is well known, and is almost impossible to prevent by orders, however stringent. It is believed, however, that if the tubs are placed conveniently at hand they will be used.

An interesting fact with reference to the contraction of typhoid from infected ground is stated by General Boynton, viz: That among the contract laborers engaged in road building and other work in the park, the average force being about 300 men, no case of typhoid has occurred in the last three years. Only seven deaths have occurred in this force during that time, four of them being known, and being as follows: One, murder; one, accident; one (a woman), in childbirth; one, pulmonary hemorrhage, occurring the day after being employed. It was stated positively that none of the seven deaths was due to fever of any sort.

General Boynton also states that among the 150 men employed from November 15 to December 31, 1898, filling the sinks, and cleaning the camp sites of volunteer regiments, no case of typhoid fever developed, although these men worked constantly in what must be considered as infected soil.

It does not seem that the absence of typhoid among these men may be due to their having acquired immunity during the year 1898, since the contractor's rolls show that with an average of 300 men there has been a constant change in the personnel of the force, 2,300 different names appearing upon their rolls.

Although there seems to have been no typhoid among the park employees since the summer of 1898, it seems certain that it has been constantly present among the civilian population surrounding the park.

The park lies partly in Catoosa and partly in Walker counties. The vital statistics of these counties, taken from the census reports, show that for the year 1900 the deaths from typhoid fever were 1.88 per thousand and from malaria 0.17 per thousand in Catoosa County, and in Walker County from typhoid 0.51 per thousand and from malaria 0.19 per thousand. The population of Catoosa County is 5,823 and of Walker County 15,661. The city of Chattanooga, with a population of 40,000, shows the following deaths from typhoid and malaria among the civil population:

	Typhoid.	Per 1,000.	Malarial and other fevers.	Per 1,000.
1898	21	0.525	7	0.175
1899	21	.525	2	.050
1900	17	.425	5	.125
1901	22	.550	3	.075
1902 (6 months)	9	.225	1	.025

In conversation with physicians practicing in the neighborhood of the park we found that they have in their practice cases of continued fever, lasting from two to five weeks, which do not yield to quinine, but which are diagnosed malaria, and it is for this reason that the deaths from malaria are given as well as those from typhoid fever.

The death rate of all cases of typhoid in the camp epidemics of 1898 is given in the report of the Reed typhoid board, above referred to, pages 190, 191 [47], as 7.61 per cent, which is shown to be approximately also the rate in civil life, including mild and probable cases. Taking this as the probable death rate in the vicinity of Chickamauga Park, we would find approximately the number of typhoid cases which had occurred there each year by multiplying the deaths by 13. This would give for the year 1900, for Catoosa County, 143; for Walker County, 104; for Chattanooga, in the year 1898, 273; 1899, 273; 1900, 221; 1901, 286; 1902 (six months), 117 cases.

We spent much time in looking up the practicing physicians and following up cases of fever which we suspected to be typhoid. There was a general inclination in the community to regard the occurrence of typhoid fever as a reflection upon the health of the community and to deny its existence. During our stay, however, we were able to locate 10 cases of fever in the vicinity of the park as certainly or probably typhoid. The village of Rossville appears to offer unusually favorable conditions for the propagation of the typhoid infection. It is an unincorporated village containing two large factories, one of woolens and the other of hosiery, and employing a large number of women and children. The operatives live in one or two story frame houses, each on its own small lot. The water supply is from surface wells about 25 feet deep, which must necessarily be at times infected by the open privies, which are in many cases close by. In a case of typhoid fever visited by us in the village the excreta was thrown upon the ground without previous disinfection, and in another case across the street the physician informed us that the patient was accustomed to get out of bed and pass his stools upon the ground on the side of the porch.

As Private Storm, the first case to appear in camp, visited Rossville eight days prior to his illness, a connection between the cases of typhoid fever at Rossville and at Camp Thomas does not seem to be an unwarranted assumption.

It is important to state that in the course of our investigation we found a case of malarial fever (Private Patrick C. Meehan, Third Battery Field Artillery, admitted July 15) which appeared to be not a recurrent attack, but an original infection.

The existence of the malaria-bearing mosquito was also established by the capture in an officer's tent of a female of the genus anopheles, species punctipennis. As a

rule, this genus does not become abundant until later in the year and it is reasonable to expect them to appear in much greater numbers by September.

As we have present at Camp Thomas both malarial infection and the agent for its propagation, prompt and energetic steps should be taken for the protection of the men and the destruction of the mosquitoes.

Steps have already been taken to screen the hospital wards with wire gauze. In addition to this precaution, mosquito bars should be issued to all the men, and they should be required to use them. The genus anopheles is a night mosquito and gives little annoyance, so that men not seeing them early in the evening, are apt to assume that the use of the mosquito bar is unnecessary and throw it aside.

The vicinity of the camp within a radius of a mile should also be inspected for stagnant pools and collections of water in holes in the rocks. These should be drained, or, if that is impracticable, located on a map and systematically treated twice a month with kerosene oil.

Steps should at once be taken to drain a large stagnant pool about 100 yards northwest of the artillery officers' tents.

If these precautions are carried out and if the measures recommended above against malaria are taken, it is believed that the command will be insured against epidemic prevalence of either of these diseases.

With a view to improving the sanitary conditions of this camp Major Kean made the following recommendations to the commanding officer:

1. That the screening of the mess rooms and kitchens to exclude flies be made complete and efficient. The construction of these buildings was so poor in this respect that they are at present large fly traps. Measures should also be taken to destroy the flies in them, as required by post orders.

2. There are six houses occupied by park employees in the immediate vicinity of the camp. These have all open and offensive privies, except one, which has none at all. A closed fly-proof privy of approved pattern should be constructed at each of these houses and they should be regularly inspected. As this is a measure for the protection of the health of the command, it seems that it might very properly be done by the Quartermaster's Department, and this would be the quickest and most satisfactory way of remedying a serious sanitary evil.

3. The sanitary conditions of the post exchange affect the entire command and should be perfect. Its present condition is far from satisfactory. It should be efficiently screened against flies; the kitchen and pantry being screened separately from the dining room. Flies now swarm there, and the standard of cleanliness is low.

4. In a permanent camp it is recognized by all sanitary authorities to be of the utmost importance to prevent in every way pollution of the soil. In spite of the admirable police of the camp it is inevitable that men will, during the night, urinate near the tents rather than walk a hundred yards to the sinks. The only way to prevent this is to provide urine tubs, which may be placed in the company streets at dark and removed at reveille. These may be conveniently made of half barrels, tarred inside, and should contain some antiseptic solution. This arrangement is common in the English service. Another reason for it is the fact that the urine in walking cases of typhoid and after convalescence often contains millions of typhoid germs.

5. The milk supply of the camp should be under medical supervision, only those dealers being licensed to sell who will comply with the rules recommended by the post surgeon.

6. As typhoid fever is prevalent in the village of Rossville, and its sanitary condition is bad, the men should be, as far as possible, kept from visiting it.

7. The command should be instructed that they may safely drink the water from the bored wells, having pumps, in the park, but the other waters should be avoided, and especially the unsterilized water piped from Chickamauga Creek. It is believed to be a very valuable sanitary precaution to wash the hands before eating. If in the opinion of the commanding officer it is deemed practicable to enforce this precaution it would be desirable to do so.

The camp surgeon, Maj. W. D. Crosby, and Dr. James Carroll, U. S. Army, concur in these recommendations.

Under date of August 6, 1902, Contract Surgeon James Carroll reported the result of an examination of the soil taken from the covered-up sinks of the encampment in Chickamauga Park in 1898.

I have the honor to submit the following report of the examination of eight specimens of soil taken from some of the sinks used by the troops encamped in Chicka-

manga Park during the summer of 1898, while typhoid fever was prevailing. The sites visited were those of the Ninth and Tenth Pennsylvania and Twelfth New York Infantry regiments.

The object of the examination was to determine whether the typhoid bacillus could be recovered, after the lapse of four years, from the earth with which the sinks had been filled. It was impossible to ascertain to what extent disinfectants had been used, and many of the sinks had been heavily covered with lime.

Samples were taken from a depth of only a few inches because it is said that the typhoid bacillus when buried deeply in the soil grows toward the surface, where it can obtain the largest supply of oxygen.

In making the cultivations the method used was that of Parietti, as follows: To a number of tubes containing 10 cubic centimeters of sterile bouillon there was added from 3 to 9 drops of a mixture of 5 parts of carbolic acid and 4 parts of hydrochloric acid in 100 of distilled water. Five inoculations were made from each sample, adding about 1 gram of the soil to each of five bouillon tubes containing 3, 5, 6, 7, and 9 drops of the acid solution respectively. A growth developed in all the tubes but two, and after forty-eight hours plate cultures were prepared. These were found to contain practically pure cultures of common saprophytic and putrefactive bacteria, mostly of the *B. subtilis* and *B. proteus* types. In no instance could the typhoid bacillus or the colon bacillus be obtained.

In July, 1902, 4 cases of typhoid fever were reported as under treatment in the general hospital, Presidio of San Francisco, Cal. An investigation into the history of these cases showed that the infection was not conveyed to these men while on the reservation. In one case the disease was probably incurred while the soldier was absent on pass. The three other cases were received from the transport *Logan*, the infection having probably been acquired at Nagasaki, Japan.

MALARIAL DISEASES.

In the Army as a whole during the calendar year there were reported 35,180 cases of malarial disease, with a death rate of only 0.59 per thousand of strength. The following shows the character of these diseases:

Intermittents: 29,498 cases, equivalent to 318.93 cases per thousand men, with no deaths and no discharge for disability.

Remittents: 4,615 cases, equivalent to 49.90 cases per thousand of strength, with 7 deaths, and no discharge for disability.

Pernicious fever: 73 cases, equivalent to 0.79 per thousand of strength, with 33 deaths, equivalent to 0.36 per thousand.

Malarial cachexia: 994 cases, equivalent to 10.75 per thousand men, with 14 deaths and 18 discharges for disability.

These records give a total of 35,180 cases, or 430.37 per thousand of strength.

Ratios per thousand of strength.

DIVISION OF THE PHILIPPINES.

	Cases.	Discharges.	Deaths.
Intermittents	431.39	.....	.....
Remittents	69.05	.....	0.10
Pernicious	1.18	.....	.55
Cachexia	14.51	0.13	.22
Total	516.13	.13	.87

Ratios per thousand of strength—Continued.

CUBA.

	Cases.	Discharges.	Deaths.
Intermittents	195.97	.....	.....
Remittents	26.62	.....	0.19
Pernicious	.....	.....	.....
Cachexia	3.02	0.19	.....
Total	225.61	.19	.19

PORTO RICO.

Intermittents	188.20	.....	.....
Remittents	33.83	.....	.....
Pernicious	.....	.....	.....
Cachexia	.87	.....	.....
Total	222.90	.....	.....

UNITED STATES.

Intermittents	96.70	.....	.....
Remittents	12.26	.....	.....
Pernicious	.11	.....	.....
Cachexia	4.26	0.34	0.04
Total	113.33	.34	.04

At posts in the United States a great deal was done during the course of the year for the protection of the troops against bites of the Anopheles, but that this did not suffice to offset the malarial diseases brought home by men returned from the Philippines and Cuba may be seen by comparing the statistics submitted above with the mean annual rates of the decade 1888–1897, during which period the strength of the Army, all of which was in garrison in the United States, was 27,117.

Mean annual ratios per thousand of strength.

	Cases.	Discharges.	Deaths.
Intermittents	62.76	.....	.....
Remittents	14.19	.....	0.070
Pernicious	.07	.....	.030
Cachexia	2.68	0.06	.004
Total	79.70	.06	.104

At the Pan-American Sanitary Congress held in the city of Habana, Cuba, February 15–20, 1902, a resolution was adopted recommending that in all countries suffering from malarial fever a campaign of education be instituted in order to popularize the recently acquired knowledge concerning the transmission of this fever; that for the purpose cards written in simple, clear language and illustrated with drawings of Anopheles mosquitoes be properly distributed among the people.

As compared with the mean admission rate of 113.33 for malarial fevers per thousand of strength for troops serving at posts in the

United States, Capt. George M. Wells, assistant surgeon, U. S. Army, called attention to the high rate of 326 admissions per thousand at Fort Wadsworth, N. Y. The mean strength of the command was 445 men. The number of admissions for malarial fever varied from none in February to 46 in September, giving a total of 145 cases for the calendar year.

There was but one month in the year during which no case was admitted, while the period of greatest prevalence was from July to October.

This would appear to show that malaria is most prevalent at this post during the months when mosquitoes are most numerous, as the latter did not make their appearance in great numbers until the latter part of May or the 1st of June, but it would also show that a not inconsiderable number of cases occurred in midwinter, when the mosquitoes are supposed to be dead, or if not actually dead, in such a stupid condition that they would be harmless through inability to bite. This brings up the interesting question of when the cases admitted in winter were really infected with the plasmodium, and the still more important question of how long the parasites may retain their vitality in the blood without producing an outbreak in the form of a fever of some type or other. In this connection I would state that in most of these cases the blood was examined under the microscope and the presence of the plasmodium demonstrated beyond question, while in a limited number of cases there was some doubt as to whether the plasmodium was or was not present. Some of these latter cases, as well as others in which repeated examinations failed to disclose anything even resembling the malarial parasite, presented a typical clinical picture of malarial fever, and yielded promptly to the action of quinine in doses of 10 to 15 grains three times a day. That the parasite was present in each case I have no doubt, although I was not always able to demonstrate it either in the fresh or stained specimen. Out of a total of 373 cases of all kinds taken up on sick report during the entire year, 145 were malarial, making considerably more than one-third of all cases treated. But when the number of days lost in hospital is taken into consideration the same ratio does not hold, for out of a total of three thousand four hundred and three days lost from all causes only seven hundred and twenty were from malaria, making approximately one in five. Of the 145 cases of malaria actually treated in hospital, 58 were of the intermittent type, while 87 were remittent. This does not show the exact ratio that actually existed between the two types of fever, for there were a great many mild cases that were never taken up on the sick report, and of these the intermittent were much more numerous than the remittent. From the 58 cases of intermittent fever two hundred and eighteen days were lost, making an average duration of three and seventy-six one-hundredths days for each case, while the 87 remittent cases caused a loss of five hundred and two days, making an average duration of five and seventy-seven one-hundredths days for each case, or two days more than the intermittent cases. The average duration of all malarial cases was four and ninety-seven one hundredths days. Of the 145 cases of malaria, 85 were from men admitted but once, 19 from men admitted twice, 4 from men admitted three times, and 2 from men admitted four times, making a total of 110 men that were treated in hospital during the year for this affection. Two hundred and twenty-eight cases, admitted for all causes except malaria, caused a loss of two thousand six hundred and eighty-three days, making an average of eleven and thirty-three one-hundredths days for each case. Most of these cases were short cases, but there were a few, especially venereal cases, that lasted a long time, one having spent no less than one hundred and fifty days in hospital, while some others lost as much as two to three months. The total disability of the command from all causes amounted to a trifle over 2 per cent of the mean strength, while the disability from all causes, exclusive of malaria, amounted to 1.6 per cent of the mean strength.

Latent and masked malaria.—One of the most important results arrived at from the examination of the blood for the malarial parasite by Contract Surgeon Charles F. Craig, U. S. Army, in the general hospital, Presidio of San Francisco, Cal., has been the great number of cases of latent and masked malarial infections discovered in soldiers returned from the Philippines. Although the fact is well known that malarial infections may remain latent for a long period in some instances, the percentage of cases exhibiting this latency, so far as

reported, has not been as large as the results obtained at this hospital seem to show. Of the 1,082 cases in which malarial parasites were demonstrated in the blood, 219 were cases of masked or latent malaria. Thus of the 1,082 cases, 20 per cent were of this class of infections.

In 20 cases diagnosed as chronic diarrhea malarial parisites were demonstrated, and in all these cases the infection was latent. Symptoms of diarrhea were present in all, but there was no rise in temperature and no symptoms which could be interpreted as being malarial in character. Treatment by quinine in these cases quickly caused the disappearance of the parasite from the blood, and, as a rule, resulted in the general betterment of the patient's condition, so that, as the cases have to be classed as latent on account of the absence of symptoms, the improvement in the patient indicates that the malarial infection has some influence in the progress of the diarrhea.

Sixteen cases diagnosed as pulmonary tuberculosis showed the presence of malarial parasites, 10 cases being due to infection with the estivo-autumnal parasite, 4 with the benign tertian. From a study of the clinical histories and temperature charts in these cases, the infection in every case was masked by symptoms which suggested pulmonary disease. Perhaps in no class of cases is the diagnosis of pulmonary tuberculosis made so often as in cases of malaria showing quotidian elevations of temperature. Such cases are often accompanied by a cough, great emaciation, profuse perspiration, and present the picture of pulmonary tuberculosis.

This is especially true of cases originating in the Tropics, the emaciation in these cases being more extreme and the pulmonary symptoms more apparent than in cases originating in the Temperate Zone. In all the cases diagnosed as pulmonary tuberculosis the parasites were present in considerable numbers, and treatment by quinine showed in a few days that the infection was purely malarial. The examination of the sputum in these cases for the tubercle bacillus always resulted negatively.

From the brief analysis of these cases of latent fever it will be seen how important an examination of the blood is in all cases of disease originating in the Tropics or in localities which are known to be malarious. It is an undoubted fact that a malarial infection complicating any disease process invariably injures the patient's chances of recovery, and its elimination, as proven by numerous cases observed at the general hospital, Presidio of San Francisco, Cal., greatly facilitates recovery. Not only is this so, but cases have been observed in which the discovery of the malarial infection undoubtedly saved the patient's life. The discovery of the cases of estivo-autumnal malaria is especially important, as it is this form of the disease that may become at any time pernicious and may cause death within a few hours.

CONSUMPTION.

Four hundred and fifty-two cases were reported from the Army during the year, equivalent to an admission rate of 4.89 per thousand of strength. The rate of discharge was 2.16, and of death 1.03. The rates in the United States were: Admission, 4.76; discharge, 3.06, and death, 0.64. In the Philippines: Admission, 4.94; discharge, 1.75, and death, 1.26. In Cuba: Admission, 4.91; discharge, 2.27, and

death, 0.57. In Porto Rico: Admission, 4.34; discharge, 2.60, and no death.

As the mean annual admission rate for the decade 1888–1897 was only 2.72 per thousand of strength, a circular was issued from this office February 24, 1902, inviting the attention of medical officers to the increasing prevalence of pulmonary consumption, and enjoining them to see that all apartments which have been occupied by cases of tuberculosis are thoroughly disinfected.

No case of tuberculosis should be treated in quarters; and in the case of officers or enlisted men, as soon as positive diagnosis is made, recommendation should be made for transfer to the United States general hospital, Fort Bayard, N. Mex. In all demonstrated or suspected cases the sputa should be promptly destroyed or disinfected.

At the Pan-American Sanitary Congress held in Havana, Cuba, in February, 1902, a resolution was unanimously adopted recommending the establishment of antituberculosis leagues, similar to those already existing in several American Republics and the island of Cuba, in the conviction that international collective efforts will more surely result in a marked and permanent decrease of the disease.

The United States general hospital, Fort Bayard, N. Mex. During the year 439 cases were under treatment at this hospital, as follows:

Remaining July 1, 1901:		
Officers, including 1 of Porto Rico regiment	6	
Contract surgeon	1	
Enlisted men	54	
Civilian	1	
Beneficiaries of Soldiers' Home	58	
		120
Admitted:		
Officers, including 1 readmitted	11	
Enlisted men, of whom 162 remained as beneficiaries of the Soldiers' Home after discharge from the service	241	
Contract nurse	1	
Civilians, authorized by War Department	5	
Beneficiaries of Soldiers' Home	61	
		319
Total		439
Discharged:		
Officers	4	
Officers returned to duty	3	
Enlisted men	33	
Enlisted men returned to duty	8	
Enlisted men deserted	2	
Contract nurse	1	
Civilians	3	
Beneficiaries of Soldiers' Home	182	
		237
Died:		
Enlisted men	20	
Civilian	1	
Beneficiaries of Soldiers' Home	31	
		52
Remaining June 30, 1902:		
Officers	10	
Enlisted men	70	
Civilians	2	
Beneficiaries of Soldiers' Home	68	
		150
Total		439

From the opening of the hospital, October 3, 1899, to June 30, 1902, 686 cases have been admitted, with results as follows:

Discharged	431
Died (27 in less than one month)	[a] 105
Remaining June 30, 1902	150
Total	686

Results in those discharged.

	Average residence.		Number.	Per cent.
	Mos.	*Days.*		
Clinically cured	8	24	36	6.7
Convalescent	6	5	57	10.6
Improved	5	28	214	39.9
Unimproved (18 discharged in less than one month)			124	23.1

Results in the three stages of the disease.

Stage.	Clinically cured.	Convalescent.	Improved.	Unimproved.	Died.	Total.
First	27	38	101	18	1	185
Second	8	12	67	38	10	135
Third	1	7	46	68	94	216
Total	36	57	214	124	105	536

The death in the first stage was due to tuberculous appendicitis. Of the 10 deaths in the second stage, 5 were from laryngeal or intestinal tuberculosis, 3 from empyema, 1 from rupture of an aortic aneurism, and 1 from acute tuberculous pneumonia.

While ordinarily sanatoria for the treatment of pulmonary tuberculosis admit only about 25 per cent of cases examined as being suitable for admission, patients are sent to the Fort Bayard hospital regardless of the extent of their lesion or their desire to come. They are not selected for treatment in a high altitude, and perhaps a few would do better at a lower elevation. Many do not realize the gravity of their affection and the importance of remaining after discharge from the service until clinically cured. Sixty-two have returned after their discharge with their pulmonary lesion much advanced and their general condition much worse.

Nearly 80 per cent of the patients come from the Tropics, and in many of these, owing to the enervating effects of the tropical climate, the disease has made rapid progress before admission.

The following is a table of comparative weights on discharge of those who have improved under treatment:

	Discharged.	Gained.	Average gain.	Lost.	Average loss.	No change.
			Pounds.		*Pounds.*	
Improved	214	160	10.1	40	5.8	14
Convalescent	57	51	12.6	4	5.0	2
Clinically cured	36	30	15.5	6	5.6	.....

The three largest gains were 76, 58, and 45 pounds.

[a] Or 19.7 per cent.

Maj. D. M. Appel, surgeon, U. S. Army, commanding the hospital, states that the longer he observes the effects of treatment in a high altitude the more he is convinced that a larger variety of cases are amenable to its beneficial influence than is commonly believed. Cases with extensive excavation in both lungs, and in which pyrexia continued for several months after admission, have finally improved to such a degree that ultimate recovery is probable, nor can emaciation, hemoptysis, or old age be considered contraindications.

The following report by Contract Surg. J. J. Curry, U. S. Army, on the effects of altitude on the blood is submitted as of interest. It is dated July 22, 1902.

The results of my observations to date on the nature of the changes in the blood of both normal individuals and of those suffering from pulmonary tuberculosis are shown in the following tables. The valuable blood counts at sea level were made through the courtesy of Col. A. C. Girard, assistant surgeon-general, U. S. Army, formerly commanding the general hospital at the Presidio of San Francisco, Cal., by Contract Surg. C. F. Craig, U. S. Army, pathologist of that hospital.

TABLE 1.—*Showing the character of the changes in normal blood due to altitude.*

	Sea level.[a]	Fort Bayard, N. Mex. Elevation, 6,040 feet.[b]
Hemoglobin ..... per cent..	100	100
Red cells	5,000,000	6,800,000
Leucocytes	7,500	9,000
Specific gravity	1.059	1.059
Volume of red cells by hematokrit ..... per cent..	50	51.75
Value of 1 degree of the hematokrit scale	100,000	134,000
Average diameter of red cells	7.5μ	6.5–25μ
Differential count of leucocytes:		
Polynuclear neutrophiles ..... per cent..	62–70	68
Small lymphocytes ..... do....	20–30	26
Large lymphocytes and transitional forms ..... do....	1–8	2.5
Eosinophiles ..... do....	3–4	3.5

[a] Cabot, Boston, Mass.: "Clinical Examination of the Blood."
[b] Curry, J. J.: From a study of the blood of 15 normal male adults at Fort Bayard, N. Mex.

It will be seen with the increase in the number of red cells there is such a proportionate diminution in the size of the individual cells that their combined surface area, or the respiratory area of the blood, remains practically the same both at sea level and at the altitude of Fort Bayard, N. Mex.

There is likewise no change in the hemoglobin percentage, in the volume of red cells as determined by the hematokrit, nor in the specific gravity of the blood. The relative number and differential proportions of the leucocytes are found to be the same as at sea level.

TABLE II.—*Showing the rapid and marked increase of the red cells in patients transferred from the United States general hospital, Presidio of San Francisco, Cal., to United States general hospital, Fort Bayard, N. Mex.*

Case.		Hemoglobin per cent.	Red cells.	Leucocytes.	Gain of red cells.	Time between examinations.	Remarks.
						Days.	
1	Presidio	68	3,356,000	9,500	2,980,000	4	Tuberculosis.
	Fort Bayard	90	6,336,000	21,400			
2	Presidio	70	3,648,000	8,000	2,336,000	4	Do.
	Fort Bayard	85	5,984,000	12,000			
3	Presidio	85	4,016,000	10,200	1,520,000	4	Do.
	Fort Bayard	70	5,536,000	12,540			
4	Presidio	80	3,360,000	6,780	1,344,000	4	Do.
	Fort Bayard	70	4,704,000	16,600			
5	Presidio	80	4,158,000	8,250	1,722,000	4	Do.
	Fort Bayard	95	5,880,000	6,800			
6	Presidio	100	4,904,000	8,580	1,144,000	4	Do.
	Fort Bayard	95	6,048,000	5,800			
7	Presidio	80	4,480,000	7,800	1,121,000	7	Do.
	Fort Bayard	85	5,601,000	.....			
8	Presidio	85	5,200,000	8,600	1,028,000	6	Do.
	Fort Bayard	90	6,228,000	.....			
9	Presidio	85	4,985,000	8,500	1,543,000	12	Do.
	Fort Bayard	95	6,528,000	.....			
10	Presidio	75	4,208,000	8,200	2,496,000	7	Do.
	Fort Bayard	90	6,704,000	.....			

Presidio, sea level. Fort Bayard, 6,040 feet elevation.

NOTE.—Average gain per patient, 1,723,400 red cells per cubic millimeter. Average length of time between examinations, five and six-tenths days.

These observations were made on 10 patients who recently returned from tropical service in the Philippines and who with one exception were more or less anæmic and in poor general condition. Nevertheless I found similar changes in their blood, both in character and degree, as occurred in normal individuals, and in 6 cases in which the examinations were made within twenty-four hours after arrival no nucleated red cells or other evidence of new red-cell formation was observed.

The largest increase in the number of red cells was presented in case 1, in which it was 2,980,000 in four days, an average of 745,000 per day. In the 10 cases the average increase was 1,723,000 in five and six-tenths days, or 307,750 per day. In all the cases the urine was normal and no apparent symptoms resulted from these blood changes.

Were the increase of red cells due to their concentration in the superficial capillaries, the hematokrit would show an increase in their volume, and if diminution in size were due to the action of the atmosphere or of the lowered barometric pressure on the blood after it had been withdrawn from the body there should occur crenation and other irregular changes in the corpuscles. On the contrary, aside from their smaller diameter the cells present the same appearance and react to stains similarly to those at sea level. The changes are probably physiological, to facilitate the more rapid and freer capillary circulation incident to high altitudes.

The following report, dated November 14, 1901, on consumption in France, forwarded by John C. Covert, United States consul at Lyons, was received from the State Department:

At a former session of the French Parliament, a commission consisting of 32 members was appointed to investigate the subject of pulmonary tuberculosis, its ravages in France, the causes of prevalence, and the progress that has been made toward its cure. The report of this commission, which has just appeared in the Journal Official, treats the subject very elaborately, covering 25 quarto pages of solid minion. I translate in part and condense from it.

Mr. Amordu, the author of the report, says that 150,000 people die of consumption in France every year. It is among the young, adults, people from 30 to 45 years of age, in the prime of life, who seem to be the special victims of this scourge. Under such circumstances consumption can not be regarded as merely one of the incidents of life; it is a dreadful enemy, which is constantly extending its ravages and daily gain-

ing ground, with no opposition to its contagious action. It can be said that in regard to France, where population is almost at a standstill, it is more than a menace to individuals; it constitutes a real national peril.

* * * * * * *

CAN BE CURED.

"If tuberculosis is a disease that is widespread and contagious, it is also a disease that can be avoided and that can be cured.

"No one now questions the truth of this proposition, and it is such fundamental truths that inspire me to set forth the ravages caused by tuberculosis, to make known the means by which it is propagated, and to indicate in a general way the methods to extirpate it."

IN AUSTRIA AND GERMANY.

Tuberculosis has its victims to-day in all countries and in all climates. Professor Leyden, in his lecture on September 7, 1894, at the Congress of Budapest, established the annual number of deaths in Germany from consumption at 170,000, 4,500 of which are charged to the single city of Berlin. He concluded that the aggregate deaths in the German Empire were from 1,000,000 to 1,300,000.

Kuty estimates the deaths from consumption in Austria at 25 per every 10,000 inhabitants. In Vienna, where this disease is called the Vienna malady ("Morbus Viennensis") the average annual deaths from consumption during the five years from 1889 to 1893 was 8,356.2. For every 1,000 deaths 232 were of consumption. For every 100,000 inhabitants 540 die of consumption. In Hungary the number of consumptives reaches over 400,000. In Budapest, in a population of 492,237, during a period of five years statistics report 3,179 deaths per year from consumption.

In twelve cities in Italy, the most populous of the Kingdom, the average annual number of deaths from consumption is 337 per 100,000 inhabitants.

In England, according to Mr. Loch, there are 150,000 to 200,000 persons sick with consumption and 41,000 deaths every year. In Switzerland, with 2,800,000 population, the number of consumptives reaches 50,000. The average for the three years 1895–1897 was 23.8 deaths from tuberculosis per 10,000 individuals. According to Dr. Knopf, of the 4,500,000 population of Portugal, 20,000 die from tuberculosis every year.

The following table from the office of the German imperial board of health gives the number of deaths for each 10,000 population from tuberculosis and pulmonary inflammation in the different nations mentioned:

Countries.	Deaths.	
	From tuberculosis.	Pulmonary inflammation.
Russia	39.8	42.1
Austria	36.2	22.8
Hungary	31.8	24.4
France	30.2	30.4
Sweden	23.1	27.2
Germany	22.4	26.5
Switzerland	20.3	21.3
Ireland	20.3	27.7
Denmark	19.1	23.2
Netherlands	18.8	40.1
Italy	18.7	47.9
Belgium	17.6	46.8
Norway	17.4	17.6
Scotland	17.3	31.7
England	13.6	31.5

MORTALITY IN FRENCH CITIES AND VILLAGES.

"Pulmonary morbidity and mortality are very general in France. If it is true, as contended by the imperial board of health of Germany, that the average duration of the disease is three years, which is rather below than above the truth, we can approximate of our people sick with that disease at about 500,000. In our cities having over 50,000 inhabitants the proportion of deaths from consumption and chronic bronchitis is 49.9 for every 10,000.

"In cities having from 10,000 to 50,000 inhabitants the proportion is 39.8 per 10,000.

"In cities of from 5,000 to 10,000 the proportion is 35.7. In cities of less than 5,000 the proportion is 33.8."

Paris is one of the great centers of tuberculosis. From 12,000 to 14,000 consumptives die there annually and the patients number about 40,000.

Many of the consumptives of Paris leave that city before they are far advanced and die in the country or in small towns, at the home of relatives. Some of them have come from the country to Paris, where they receive the first taint of consumption and bear the germs back with them to the old homes. If exact figures could be given of the number of persons thus leaving Paris it would materially raise the total number of deaths from that disease which should be charged to that city.

Monsieur Amodru gives elaborate statistical tables of the ravages of the disease in Paris, by wards or arrondissements, showing that the deaths are more numerous in proportion to population among the poor than among the rich. He quotes from the report of the extra-parliamentary commission, made to the ministry of the interior, that in towns of less than 5,000 inhabitants the number of consumptives increases in proportion as the population is lowered. It is true that this report applies to only 89 towns—insufficient to establish a precise rule. They give merely an indication, but until it is controverted it will remain a very disquieting indication.

Unfortunately, the observations thus far indicate that the disease is much more prevalent in the country than was supposed. Professor Brouardel, in his report to the extra-parliamentary commission, says that this question of the "progressive invasion of the country by tuberculosis has occupied my mind for several years. I have questioned many physicians on the subject, and their observations all tend to the one conclusion of the marked invasion of the country districts of France by this disease."

Dr. Ricochon, in speaking of an epidemic of consumption in a village, attributed its constant increase to the presence of the large barracks filled with soldiers. Compulsory military service causes the presence in the barracks of a constantly increasing number of consumptives, who are sent back yearly to die in their homes. Every one of them may create a center of tuberculosis contagion, all the more dreadful because military tuberculosis seems to be of exaggerated virulence. I could cite many cases of soldiers rejected as unfit who have communicated the disease in so short a time that they lived to see a brother or sister die from it.

In Paris and the Department of the Seine, in a given space of time, consumption each year caused 38 times more deaths than varioloid and scarlatina combined, 16 times more than typhoid fever, and 8 times more than diphtheria.

Statistics prove that consumption is increasing in France and Italy and is decreasing in England, Germany, and other countries. Its home is in all countries, and it attacks people of all ages, but statistics establish that it is between the age of 15 and 60 years that a person is most exposed to contract it and die from it. Men are more subject to it than women. The statistics of Würzburg, Bavaria, establish the proportion of 35.48 among men and 28.55 among women.

According to the Bertillon statistics the mortality in Paris is the same for the two sexes up to 15 years of age. After that the greater increase is among men.

During the six years from 1892 to 1897, 29,476 persons died of consumption in Paris, 17,006 men and 12,470 women.

Dr. Mingot, in report presented January 9, 1901, to the minister of the post-office and telegraph, says that among the 71,000 employees of the department the deaths from tuberculosis amount to 40 for every 10,000. For the Department of the Seine, Paris, this proportion increased to 62 for every 10,000, while in the general population of Paris the proportion is 49 for every 10,000. One of the great railroad companies reported that out of 40,000 employees 271 died of consumption in 1896 and 257 in 1897. In 1898 the number of employees was 41,800; deaths from consumption, 285.

The following table gives the losses in the army from tuberculosis during the ten years mentioned:

Years.	Invalided per 1,000.	Deaths per 1,000.	Total losses per 1,000.
1888	4.30	1.18	5.48
1889	4.94	1.05	5.99
1890	5.70	1.08	6.78
1891	6.10	1.33	7.43
1892	6.55	1.04	7.59
1893	6.33	.94	7.27
1894	6.55	1.01	7.56
1895	8.34	1.14	9.48
1896	7.34	.94	8.28
1897	7.84	.95	8.79
1898	7.13	.78	8.01

The number of persons rejected from the Army as consumptives increased very materially from 1888 to 1898. It passed from 4.30 per thousand to 7.13 per thousand. The number of deaths from the same cause diminished during that time from 1.18 to 0.88 per thousand. The total losses from deaths and rejection rose from 5.88 to 8 per thousand.

The armies of other countries also pay a heavy tribute to tuberculosis. A table is given which shows that the losses by death or rejection on account of tuberculosis are increasing in all the armies of Europe except that of England, where the mortality from consumption is diminishing.

Dr. Vincent affirms that of all diseases it is tuberculosis which causes the greatest ravages in the fleet. Jules Richard says that in 1855 "tuberculosis moves rapidly on board ships. Nothing is more true, and this is due in the first place to the close contact of men with each other, which increases the chances of contagion. But fatigue, overwork, the variations of temperature to which the men are exposed in going from one climate to another, are so many causes which explain the rapid development of consumption in the marine service."

From 1888 to 1897 the statistics of the marine hospital at Brest report 1,119 deaths, of which 501, 46.8 per hundred, that is to say almost half, were from consumption. In 1893 for the five marine hospitals in the ports of Brest, Cherbourg, Lorient, Rochefort, and Toulon the statistics report 35.5 per hundred deaths from consumption.

In 1898 the total number of deaths in our fleet rose to 2,176. Of this number 635, that is, more than one-quarter, were from consumption.

The army, the marine, and the railroads are not the only conglomeration where tuberculosis develops readily. Professor Brouardel says that wherever a man in his work, in the pursuit of pleasure, or while sick, is compelled to live part or all of the time among other people where habitations are overcrowded or even unhealthy the conditions necessary for imparting the disease exists. If he is well, his companions are a danger to him; if sick, he is a danger to them. The conditions of modern society oblige men to live together. As a child he is exposed in school; as an adult in the barracks, a workmen in the workshops; as a student in the schools, libraries, and laboratories. If he travels, he is exposed in carriages, railroad cars, too often dirty, in the hotels where patients have often preceded him, and insufficient pains have been taken to protect the new guest from possible contagion. Poor and sick, he enters a hospital where all the environments menace him. This peril from the crowding of people together is inherent in the very progress of civilization. It is the tribute we pay and it explains the constantly increasing menace of tuberculosis.

The following are a number of places which may become centers for breeding tuberculosis: Lyceums, colleges, and all kinds of schools, post-offices, courts, prisons, factories, hospitals and asylums, railroads, street cars, hacks, boats, stores, theaters and concerts, churches, libraries, convents, monasteries, restaurants, and saloons.

It was in 1865 that Villemain, in a celebrated letter to the Academy of Medicine, first declares that tuberculosis was contagious. The powers of resistance of the tuberculosis bacilli is very great. After heating them three hours at 100° they were found to retain all of their virulence. Moist heat, sunshine, and fresh air are the best known agents for the destruction of the bacilli. Savinski, after many experiments with tuberculosis sputum, concluded "that these expectorations could retain their virulence indefinitely while they remained in darkness, but that they lost it when exposed to the action of sunlight." Other authorities are here quoted in support of the sunlight cure.

It is not the breath of the consumptive which is contagious; the air which he expels does not contain the germs; it is the spittle, dried and reduced to dust, which is generally the agent of contagion. This dust coming from the dried spittle, and in which there are thousands of bacilli, arises in the atmosphere, enters the respiratory organs, infecting the bronchial tubes and lungs. Heller calculates that the bacilli expelled by a consumptive in one day number not less than 7,200,000,000.

The writer cites a number of cases of the disease caused by inhaling the bacilli expelled from consumptives.

Hypollite Martin has made many interesting experiments, in which he reports the inoculating of guinea pigs and rabbits with milk bought here and there in Paris. Since the discoveries of Dr. Koch there is no essential feature of the tubercular bacilli with which we are not familiar, and so widespread and numerous have been the experiments regarding its vitality and its resistance to physical and chemical agencies that it is now thoroughly understood.

THE CONSUMPTIVES BREATH NOT CONTAGIOUS.

All agree that the air expelled by the patient does not contain the bacilli, and that it is the same in regard to the physiological secretions. Only the spittle is dangerous, and even there the liquid must be dried so that the bacilli can float in the

air in the form of dust. It is demonstrated also that this dried spittle clings to the wall, the furniture, and the floor of the patient's room for months and even years. It is shown, on the contrary, that sunlight very speedily—in a few hours, in fact—destroys the bacilli. It is also demonstrated that consumption is contracted through the respiratory organs, but also and much less often by milk, and perhaps by meat of consumptive animals.

In short, we know that there is one kind of tuberculosis called "closed," very frequently ganglionary, osseous, and visceral; but in such cases the bacilli are prisoners and consequently inoffensive. Such consumptives offer no danger of contagion. We know also that the consumptive that expectorates the bacilli is dangerous and that we must protect ourselves against him. "Open" tuberculosis is the enemy which must be constantly combated.

NOT NECESSARILY CONTAGIOUS.

Consumption is by no means necessarily contagious. A healthy man, not predisposed, possesses a power of resistance to the bacilli, a natural immunity, which permits him to escape the contagion.

Although tuberculosis may not be hereditary, it is certain that the children of consumptives, by the mere fact of their birth in a state of organic weakness, are predisposed to the bacilli. In the same manner, children and adults who are characterized by what Lorraine and Brouardel call "infantilism" are more subject to consumption than others.

ALCOHOL THE GREAT ALLY OF CONSUMPTION.

General debility, overwork, every kind of excess, predisposes one to that disease. The influence of alcohol in developing consumption is denied by no one to-day. All clinicians have recognized this fact, and Professor Landouzy, in a résumé of his observations, used the picturesque expression that "alcohol makes the bed for tuberculosis."

Tuberculosis produced by alcohol generally occurs at an advanced age and its progress is very rapid. Of 252 patients suffering from pulmonary tuberculosis Jacquet found 180 caused by alcohol. Mr. de Lavarenne, in his report to the extra-parliamentary health commission, after having demonstrated that the deaths from consumption are increasing in France, proved that the increased mortality is in exact proportion of the increased consumption of alcohol.

The departments which are the greatest centers for tuberculosis are almost always those where there is the greatest consumption of alcohol. It is therefore of the first importance in the war against consumption to also combat drunkenness. Consumption is avoidable. Brouardel says that if a person is predisposed to it from birth, he may escape it by living in a healthy locality, in an apartment exposed to air and sunshine. On the contrary, a strong and vigorous man, with no hereditary or acquired predisposition, may not escape the contagion if he lives in unhealthy surroundings. It is in dark, closely packed abodes that this disease is cultivated.

TO PREVENT THE SPREAD OF THE DISEASE.

It should be thoroughly understood that the spread of this disease can be prevented. People must be prohibited from spitting on the floors, and the dried dust from expectoration must be rendered harmless. It has been proposed that the act of expectorating upon the ground or floor anywhere should be made a crime and punishable as such. Without going so far, for it seems to us it would be very difficult to prevent spitting in the street, it would suffice to confine the prohibition to buildings under the control of the State, depots, museums, etc. "We should recall that this prohibition exists in America and has never called forth much criticism. Knopf reports that a few years ago in San Francisco a well-known millionaire, Mr. B———, was condemned to twenty-four hours in prison for violation of this law."

Another precaution is profuse sprinkling before sweeping. This should apply to streets and sidewalks as well as to the interior of houses. Houses and the apartments of consumptives should be thoroughly cleaned and ventilated after the departure of the patient.

In its general conclusions the report recommends careful inspection of meat and milk; the organization of a veritable crusade against tuberculosis in the barracks; the prohibition of the use of alcohol among soldiers; a ration of 360 grams of meat

daily; the placing of large hygienic spittoons everywhere, raised 3 feet from the ground, and improved ventilation. The use of metallic spittoons containing antiseptic solution is recommended and the floors to be well sprinkled before being swept. These recommendations also apply to the marine, with the addition that all consumptives should be kept isolated. The use of disinfected metallic spittoons and the recommendation in regard to sweeping applies to all public buildings, depots, saloons, schools, places of amusement, etc.

CONSUMPTION IS CURABLE.

The report declares that consumption is curable at all stages. Professor Bouchard is quoted as saying, "This disease, which is cruel to mankind, is curable in the greater number of cases." All medical action should be constantly inspired on the belief that the disease is curable. The contrary idea is nothing more than an historical souvenir."

Mr. Darenberg says that during the last ten years he has cured a number of consumptives, who have resumed their active occupations, have married, and now have healthy children. "I can even say," says he, "that I myself am the consumptive that I know the best of those I have cured. I am therefore able to confirm that consumption is curable."

Pure air, such as is found on the seashore and on high mountains, is the best remedy for consumption. That air, free from microorganisms and dust, smoke, the numerous adulterations engendered by human activity, far from the industrial centers and the numerous fermentations of decaying substances in the large cities, contains all the necessary aseptic qualities. However, in order that this remedy should be effective, this pulmonary asepsis should be continuous—that is to say, that the patient should not only keep his windows and doors open night and day, but that he should persevere in this air cure for a long time.

He should have plenty to eat, and eat often, and should enjoy absolute physical and mental repose. Sanatoria for consumptives should be constructed in a place sheltered from unfavorable winds; in a healthy locality, in the neighborhood of pure water, where the air is free from dust and poisonous emanations; in an isolated spot at a good distance from any large population—if possible, on the southern slope of a wooded hill or mountain, where the summit of the hill and neighboring trees protect it from strong winds.

DISEASES OF THE RESPIRATORY SYSTEM.

These diseases gave an admission rate of 79.58 for the Army as a whole: 50.30 in Porto Rico, 62.19 in the Philippines, 71.93 in Cuba, and 121.40 in the United States.

RHEUMATIC AFFECTIONS.

There were recorded in the Army during the year 366 cases of rheumatic fever, or 3.96 cases in every thousand of the strength. One death occurred, the fatal case being reported from the Philippines. The admission rate did not vary much in the different commands. It was 4 per thousand in the garrisons of the United States, 4.34 in Cuba and Porto Rico, and 3.90 in the Philippines and China.

In addition to these, muscular rheumatism, chronic articular rheumatism, and other diseases of the muscles, bones, and joints gave an admission rate of 58.98 with 1.60 discharges for disability per thousand of strength in the Army as a whole: 71.36 with 2.90 discharged among the troops serving at the home stations, 53.94 with 1.08 discharged in the Philippines, 54.37 with 1.14 discharged in Cuba, and 54.64 with 1.74 discharged in Porto Rico.

INTESTINAL DISEASES.

During the calendar year 1901, 28,918 cases of intestinal disease were reported, equivalent to 312.69 cases per thousand of the strength, with 0.75 per thousand discharged for disability and 3.64 deaths, as follows:

	Cases.	Ratio per 1,000.	Discharges.	Ratio per 1,000.	Deaths.	Ratio per 1,000.
Dysentery, acute	4,203	45.47			115	1.24
Dysentery, chronic	2,391	25.85	53	0.57	171	1.85
Diarrhea	20,303	219.51	9	.10	19	.21
Enteritis	1,756	18.99	3	.03	17	.18
Appendicitis	265	2.87	5	.05	15	.16
Total	28,918	312.69	70	.75	337	3.64

IN THE PHILIPPINES.

Dysentery, acute	3,929	66.01			113	1.90
Dysentery, chronic	2,073	34.82	15	0.25	162	2.72
Diarrhea	17,053	286.48	4	.07	19	.32
Enteritis	1,498	25.16	2	.03	15	.25
Appendicitis	157	2.64	2	.03	8	.13
Total	24,710	415.11	23	.38	317	5.32

IN CUBA.

Dysentery, acute	59	11.14				
Dysentery, chronic	2	.38				
Diarrhea	586	110.63				
Enteritis	31	5.85				
Appendicitis	9	1.70			2	0.38
Total	687	129.70			2	.38

IN PORTO RICO.

Dysentery, acute	19	16.48				
Dysentery, chronic	2	1.73	1	0.87		
Diarrhea	53	45.97				
Enteritis	2	1.73			1	0.87
Appendicitis	4	3.47			1	.87
Total	80	69.38	1	.87	2	1.74

IN THE UNITED STATES.

Dysentery, acute	196	7.39			2	0.08
Dysentery, chronic	314	11.84	37	1.40	9	.34
Diarrhea	2,611	98.47	5	.19		
Enteritis	225	8.49	1	.04	1	.04
Appendicitis	95	3.58	3	.11	4	.15
Total	3,441	129.77	46	1.74	16	.61

According to a report from Col. A. C. Girard, assistant surgeon-general, U. S. Army, commanding the general hospital, Presidio of San Francisco, Cal., there were 837 cases diagnosed as chronic dysentery admitted to the hospital during the year, of which 279 were due to ameba of dysentery, the remainder being divided between the ordinary catarrhal form of dysentery and the chronic specific form. Of the amebic cases 9 died; of the chronic specific form, 12. One case died which showed the characteristic lesions of marked catar-

rhal dysentery. The small rate of mortality shown in the cases of dysentery admitted to the hospital during this year is due to two factors: First, that the cases admitted were not in as advanced a stage of the disease as those admitted in previous years, as a rule. Second, that the experience in treatment of dysentery cases at this hospital for three years has resulted in a better knowledge of the therapeutics of the disease, and consequently better success in its treatment. In the amebic cases the injection of a strong solution of quinine has been pursued as a routine measure. This treatment has proven most satisfactory, as shown both by the physical condition of the patient after commencement of the treatment and by examination of the stools in the laboratory. The ameba quickly disappeared from the feces, as did also blood and mucus; the patients gained in flesh, and in the majority of cases rapidly convalesced. Some of the patients, however, after treatment has been discontinued, relapse, and it is again necessary to resume the treatment. Taken all in all, the treatment by quinine injections in amebic cases has proven the most satisfactory that has yet been tried at this hospital. In the cases which were not amebic various therapeutic procedures have been tried, but in all these cases the element of diet seems to play a more important part in the recovery of the patients than anything else. No routine diet has been found to be satisfactory, each case having to be treated separately. A strict milk diet in some cases rapidly promotes convalescence in the patients while in others it has been found necessary to give some solid food. A thorough study of the cases of dysentery, aside from those due to ameba, but proves the fact that each case must be judged separately and studied thoroughly. Routine treatment in these cases is unsatisfactory. Injections have been used somewhat extensively. Those containing nitrate of silver have in a few cases proven very beneficial, but in most cases the severe pain caused by the use of this solution has precluded its employment.

CHOLERA.

No case of cholera was reported from the Army during the year 1901, but on the afternoon of March 20, 1902, two suspicious cases were reported to the board of health of Manila as being present in the San Juan de Dios Hospital. Lieut. R. P. Strong, assistant surgeon, U. S. Army, was sent to investigate these cases, but before he had concluded his inquiry two other cases were reported. As the result of his examination of these four cases he reported to the board that cases of Asiatic cholera were present in Manila, and that the spirillum of Koch had been isolated from these cases. Orders were immediately issued from headquarters of the Division of the Philippines containing instructions to all officers for the protection of their commands, of themselves, and their households; and Colonel Sanger, inspector-general and chief of staff, was directed to visit all barracks and camps, corrals, and other places pertaining to the administration and command of the army in Manila, and to ascertain whether the orders were thoroughly understood and in course of execution. Two days later orders were issued announcing that at the request of the civil governor all medical officers were made members of boards of health and required as such to take charge of the sanitation of the towns in which they were stationed. On the same day the chief surgeon issued a circular with regard to the use of disinfectants.

These instructions and requirements were promulgated in the departments of the division. Later, on April 11, a circular was issued from headquarters of the division giving a very thorough discussion of the cause, prevention, pathology, diagnosis, and treatment of Asiatic cholera, compiled by Maj. Charles Lynch, surgeon, U. S. Volunteers. As the result of the carrying out of the measures required by these orders and circulars the troops in Manila and other infected towns suffered little from the disease, while the native and Chinese residents suffered severely. In his report for the month ending May 15, 1902, the chief surgeon reported that in Manila, which was the focus of the disease, no case had occurred among the troops, but that Pasay, Santa Mesa, and the transports *Warren* and *Hancock*, in the harbor, each had a case or two. Outside of Manila, however, 51 soldiers had been affected and 31 had died. The disease first appeared in soldiers in the Camarines, 14 cases having been reported from that province, the other 37 having occurred in small places near Manila, especially on the lake, in men who had drank Pasig River water while en route to their stations. With a view to guarding against infection from this cause in the future, a recommendation was made to include in orders for the movement of troops in cholera territory a paragraph requiring the providing of distilled water and cooked food in sufficient quantity, and the presence of a commissioned officer on each casco or other boat.

In the city of Manila at this time the cases numbered 1,005 and the deaths 800. Twenty-three Americans and 13 Europeans had been attacked, with 18 and 10 deaths, respectively. In the provinces 3,210 cases, of which 2,522 were fatal, had been reported, but it is probable that a moderate estimate of unrecognized, unreported, or concealed cases would add 20 per cent to these numbers.

A report written about this same date by Capt. Thomas R. Marshall, assistant surgeon, U. S. Volunteers, in charge of the Santa Mesa and the San Lazaro cholera hospitals, shows 186 admissions, of whom 4 were Americans, 4 Europeans, 157 Filipinos, 20 Chinese, and 1 Japanese. The mortality among these patients was 82.16 per cent, but of these 4.33 per cent died en route to the hospital, and 18.37 per cent were practically dead on arrival and expired shortly after admission, notwithstanding vigorous stimulation. If these deaths en route and cases admitted in collapse are deducted from the total mortality, the death rate of those who really underwent medical treatment is reduced to 59.46. Rice water stools, vomiting, suppression of urine and bile, shrinking of the soft spots, fallen cheeks, pinched nose, sunken eyes, shriveled fingers, cold body surface bedewed with a clammy sweat, rapid and shallow respiration, thready, weak, and rapid pulse, with voice sunken to a whisper or entirely lost, and subnormal temperature were the characteristic symptoms. The definite lines of treatment advocated from time to time proved of no material service. These included the eliminative treatment of Johnson, the ice-bag treatment of Chapman, the various antiseptic methods directed to the destruction of the vibrios in the intestinal canal, and the drugs designed to counteract the physiological effect of the cholera toxines. Benzozone (benzoyl acetyl peroxid) was administered in capsules as a germicide in doses from 0.065 to 0.32 cubic centimeter, but it was found to be a gastric irritant, producing almost invariably retching and frequently vomiting. When the capsule was ruptured by the teeth in

the act of administration, which was frequently the case with natives and Chinese, the drug produced excoriation of the mouth and tongue, gums and lips, so that nourishment by mouth was seriously interfered with, necessitating nutrient enemata and a discontinuance of the drug. When this drug was administered in solution (1:1000) by rectal injection beneficial results were claimed. The injection of 237 cubic centimeters of normal salt solution with 30 cubic centimeters brandy into the lower bowel of all adult cases on admission, and a proportionate quantity for children, proved stimulating and advantageous. The transfusion of normal salt solution into the larger veins in from 30 to 60 cubic centimeters was resorted to in a large number of cases, and in collapse it gave the most gratifying results. The use of strychnine hypodermically proved more advantageous than digitalis, nitroglycerin, or whisky. Opium, caffein, chlorodyne, and brandy were used with good results. Concentrated liquid nourishment only was employed, and this in quantities of from 30 to 100 cubic centimeters, as indicated by gastric toleration. Milk, milk punch, eggnog, soft-boiled eggs, wine, and beef extract were best retained, but gastric intolerance was so common a symptom that rectal enemata had frequently to be employed.

A report from Ibaan, Batangas Province, by Capt. L. B. Sandall, assistant surgeon, U. S. Volunteers, shows the difficulties encountered by medical officers in their efforts to combat the disease among the natives. In anticipation of an invasion of cholera from Manila, a local board of health was organized and held regular meetings. Twelve inspectors and 45 subinspectors were appointed. Cholera, with the methods by which it is spread, was thoroughly explained to them and the best means for its prevention were discussed in detail, with the reasons for each precaution taken. Each inspector visited his district once every day and the post surgeon visited all the districts twice a week. A great deal of cleaning up was done and a quarantine against other towns was established. After these precautions were taken the first case of cholera was reported by an inspector. The surgeon found the patient dead on reaching the house. He found also that all the neighbors had visited the sick man before his death. That same afternoon another case, also fatal, was reported. All the neighbors had been present at the patient's death and the children of the household were scattered in several different places. Next day cholera was reported in three barrios, and on the day after in two more. The surgeon found that the people would not keep out of the cholera-infected houses nor follow instructions in any way. Soiled clothing, which, in accordance with orders, should have been burned, was washed in the river for future use. Regulations required infected houses to show a red flag, but the natives gave no heed to this warning and to them the presence of the flag was seemingly only a kind of a joke.

In his report for the month ending June 15, 1902, the chief surgeon gives the following statement of the cholera situation:

> Cholera has attacked 2 officers, 62 American and 1 native soldier. The greater number of cases in troops has occurred in Laguna and Batangas. The cause in the majority of instances has been the drinking of infected water. A few cases have been due to food contamination, either by handling or by flies. A total of more than 150 places has been attacked, extending from Laoag on the north (1 case in the harbor), or Lingayen (3 cases among natives in the town), to Dulag, Leyte, on the south. A few cases have appeared in Samar and Leyte, but the disease has

not spread widely. In the Camarines Sur the epidemic seems to have been stamped out, but in Laguna and Batangas and the adjacent part of the province of Tayabas cholera has spread in virulent epidemic form, hundreds of cases probably having occurred without report.

Outside of Manila a total of 5,967 cases have been reported, with 4,290 deaths. In the city, 1,350 cases, with 1,100 deaths.

Cholera work, as reported in April, is carried on by the insular board of health in the city of Manila and by army medical officers acting as health officers at nearly all places in the provinces. The additional demand on medical officers has been met in the most satisfactory manner. Commerce is extensive between points on the lake in Laguna Province and Manila. As long as the ports of that province were closed no cholera appeared, but immediately on opening them the disease attacked first the ports and thence spread back into the country, invading nearly every town in its course. It is here especially where many cases die without being reported. The people in the small towns are very ignorant, consider cholera as a visitation from Providence, and can not be induced to take proper precautionary measures. There have been no rains during the month which have particularly affected the cholera situation.

Later information indicates a greatly increased prevalence of this disease. The chief surgeon, in his report for the month ended July 15, 1902, states that—

Cholera has spread widely through Luzon during the month, and has appeared in the island of Cebu. In Samar and Leyte the disease is still present, but has attacked comparatively few people in the small number of towns invaded. The contrary has been true in the recently infected sections of Luzon. In Pangasinan especially cholera has been extremely virulent, spreading rapidly from town to town, with great numbers of deaths. With the increase of the epidemic the proportion of recorded cases has very much decreased, and it is probable in the whole archipelago not more than one-fourth or one-fifth of the cholera cases are now being reported. The insular board of health is almost entirely confining its efforts to the city of Manila, and such sanitary work as is done in the provinces is carried on by medical officers of the Army, but inasmuch as many towns are not now occupied by troops, cholera rages in them unchecked. A total of 25,000 cases is thought to be a conservative estimate for the archipelago. Quarantine regulations have become very irksome to natives generally. This, combined with the apathy of the people, makes the outlook extremely serious. In former epidemics cholera has always increased with the first rains. This is due to the fact that infected material deposited on the banks of streams is carried down to be drunk by the inhabitants on the lower reaches. Very heavy typhoons have, on the other hand, so increased the volume of water as to apparently sweep clean the banks of all streams, with the consequent subsidence of cholera epidemics. Such storms do not occur every year. Until a heavy typhoon comes, the disease may be expected to gradually spread from place to place and from island to island.

Among the troops 2 officers and 75 men have been attacked during the month, both officers and 52 of the men fatally. Nineteen men and the 2 officers belonged to native companies, though one of the latter was detached from his command. Several cases have occurred in Manila, but the majority of cases in troops have been in Laguna and Batangas.

GENERAL ORDERS, No. 58.

HEADQUARTERS DIVISION OF THE PHILIPPINES,
Manila, P. I., March 23, 1902.

I. Asiatic cholera is a disease the infection of which is taken in by the mouth; as a preventive measure it is therefore necessary to eat or drink only articles in which the infective principal has been destroyed by distilling, cooking, etc. Unboiled water, including aerated waters not imported, and sorbete, the native ice cream, fresh vegetables of any sort, as lettuce, cabbage, fresh fruits, etc., which are not cooked in their preparation are therefore dangerous and to be avoided. In addition, the greatest care must be given to the preparation of foods and dishes on which they are prepared or served. The infection may be carried by washing such dishes with infected water or by wiping them with cloths which have been washed in such water.

II. All officers stationed in this division will give personal instructions and care to see that no member of their family or servant in their household drinks water that has not been distilled, or if not distilled, that has not been thoroughly boiled for at least twenty minutes, or any aerated waters except those imported, or sorbete, or eat fresh vegetables or fruits of any sort which have not been thoroughly cooked. Further, personal care and superintendence is enjoined in the use of boiled water in

the washing of dishes and thorough boiling of the cloths which may be used to wipe such dishes. The irresponsibility and ignorance of native cooks render careful personal supervision of the kitchen imperative in order to avoid this disease.

III. The same care is enjoined as specified in the preceding paragraph in the use of water and preparation of foods in barracks or other buildings or camps where enlisted men or government civilian employees are stationed. All soldiers and all United States civilian employees in this division are forbidden to use water for drinking obtained from rivers or wells in the vicinity of Manila unless the same has been distilled or thoroughly boiled. No excuse for ignorance in regard to this will be accepted, and proper disciplinary measures will be applied for any detected violation of this paragraph.

IV. In order to prevent possible infection of food by flies, company commanders and other persons in the military service or attached thereto, in charge of messes, are enjoined to take the necessary measures to protect all food from flies and other insects. That this may be carried out food should not be placed on the table until immediately before it is to be served and should be covered at all times. The attention of company commanders and other persons in the military service or attached thereto is called to the necessity of care in covering the contents of dry earth or other closets with earth or chloride of lime, in order that flies may not have access to such contents with possible later transference of infectious material by such flies to food stuffs.

V. As the division commander can not be certain that saloon keepers will not serve unsterilized water for customers to drink, all persons in the military service or civilian employees therewith are directed to confine their drinks at saloons, if they drink at all, to beer.

VI. A sentinel or responsible watchman will be posted at every faucet where water is obtained from city water mains for army use, and such sentinel or responsible watchman will be instructed to permit no person to drink thereat.

VII. All officers and employees of the transport service, ships chartered or otherwise employed in the military service will be at once warned to comply strictly with the foregoing regarding consumption of vegetables, etc., and drinking water.

VIII. All persons affected with diarrhea or vomiting will report themselves immediately to their medical officers for treatment.

IX. All cases of cholera or cases suspicious of that disease coming to the notice of medical officers will be immediately reported by telegraph to the chief surgeon of the division.

X. Cholera having made its appearance in Manila, careful attention to diet and the use of water rendered safe by boiling, with the avoidance of insanitary localities, are all necessary in order to secure immunity from that disease.

XI. This order will be read to all troops as soon as received and a copy kept posted in all barracks, quarters, and camps.

By command of Major-General Chaffee:

W. P. Hall,
Assistant Adjutant-General.

General Orders, No. 66. Headquarters Division of the Philippines, *Manila, P. I., March 25, 1902.*

In view of the presence of cholera in the city of Manila, the civil governor of the Philippine Islands has requested from the commanding general the cooperation of all medical officers in the division, with a view to limiting the spread of and to stamping out this disease. As means to this end medical officers are hereby announced as members of boards of health and will be guided by the following instructions:

By virtue of their membership in such boards they will take charge of the sanitation in towns in which they are stationed. Under their advice and supervision all such towns will be put in the best possible sanitary condition. This will be done in cooperation with the board of health, when such a board has been organized; when not organized, they will take the necessary measures at once to constitute such a board.

In the sanitation of towns special attention will be paid to pure water supply, noncontamination of foods, removal of fecal matter and garbage, with burial at a distance from the town. Great care will be taken that no fecal matter reaches streams. The details for these and other sanitary measures are left to the individual medical officers.

A site for a detention camp will be obtained in each town. This need may be met either by putting up temporary bamboo and nipa shelter at an isolated spot or, better, by obtaining an isolated house.

On the appearance of a case of cholera, all persons who have been in contact with such case, except necessary attendants, will be removed to said camp. The sufferer from the disease may be left in the house in which he was attacked, which should be guarded until his recovery or death. In the latter case the body will be burned or buried with quicklime. If the house in which the case has occurred is of nipa, it will be burned; if of wood, carefully disinfected.

In towns attacked by cholera all water will be boiled, all sales of vegetables which are not cooked in preparation for the table will be prohibited, and all such vegetables on hand will be destroyed.

Medical officers will organize boards of health in towns contiguous to stations where boards have not already been established, and will cooperate in the work of such boards in the same manner as in towns where they are stationed.

An immediate telegraphic report will be made to the chief surgeon of the division of the occurrence of cholera.

Commanding officers of stations are directed to give every assistance possible in the carrying out of this work, so necessary in limiting the ravages of this disease.

By command of Major-General Chaffee:

W. P. HALL,
Assistant Adjutant-General.

CIRCULAR No. 5.

HEADQUARTERS DIVISION OF THE PHILIPPINES,
OFFICE OF THE CHIEF SURGEON,
Manila, P. I, March 25, 1902.

Owing to the presence of cholera in the city of Manila and probably in surrounding towns, the greatest care should be exercised in disinfection of the contents of all closets. As good quicklime can not be obtained in this division, chloride of lime will be utilized for this purpose.

Chloride of lime should not be used dry, but in a 4 per cent solution in water; in vaults, in the proportion of 5 parts to 100 parts of the contents of the vault, and the daily addition of 10 parts for 100 parts of daily increment of feces; in dry-earth closets, in the proportion of 10 parts for 100 parts of the daily amount of feces.

The contents of dry-earth closets will not be dumped into streams, but will be buried. The contents may, however, be dumped into the sea or tide-water streams, when there is no possibility of the water being drank.

Accumulations of organic matter undergoing decomposition which can not be removed or buried may be treated with the same 4 per cent solution of chloride of lime.

If sufficient disinfectants are not on hand, immediate requisition will be made for them, if necessary, preceding request by telegraph.

The use of disinfectants will not be held to relieve the surgeon, under the direction of the commanding officer, from the supervision of the hygiene of posts and commands. Such supervision in the presence of cholera should extend to the minutest sanitary details.

By order of Lieutenant-Colonel Heizmann:

CHARLES LYNCH,
Major, Surgeon, U. S. Volunteers.

CIRCULAR No. 24.

HEADQUARTERS DIVISION OF THE PHILIPPINES,
Manila, P. I., April 11, 1902.

The following compilation upon the subject of "Asiatic Cholera," by Maj. Charles Lynch, surgeon, U. S. Volunteers, is, upon the recommendation of the chief surgeon of the division, published for the information of this command:

By command of Major-General Chaffee:

W. P. HALL,
Assistant Adjutant-General.

ASIATIC CHOLERA.

Definition.—An acute infectious, epidemic disease, caused by the presence of the spirillum of cholera, the so-called comma bacillus of Koch, in the intestines, and characterized clinically by profuse purging and vomiting of a colorless, serous material, rapid collapse, and a high mortality.

History of the disease.—Although cholera has probably been endemic for hundreds of years in Lower Bengal and other Eastern localities, the great epidemic of 1817 first attracted serious attention from European observers. That epidemic did not, however, invade Europe, but spread widely over the East.

Europe was first attacked in 1830; the disease followed the trade route through Persia, entered Russia, and finally reached the British Isles in 1832. The same year cholera attacked the United States, the infection being carried by way of emigrant ships through Quebec, to extend as far west as the military posts on the Upper Mississippi; New York was also infected direct from England. The epidemic traveled all over the continent of Europe, where it lingered to 1839.

In America cholera recurred in 1833–34. The disease again invaded Europe in 1840, to remain until 1851, being carried to America through New Orleans in 1848, to spread widely in the Mississippi Valley, extending west even to California. The third European invasion, or possibly rekindling of the preceding epidemic, covered the period from 1848 to 1857. In America it again appeared in 1849.

Other epidemics occurred in Europe in 1853–1857, 1870–1873, 1879, to linger to 1887, and 1891 to 1895; in America in 1854, 1866, 1867, and 1873.

Because of modern means of communication the disease has traveled much more rapidly westward in the more recent epidemics. This was especially noticeable in the European attack in 1891–1895, which is so well remembered on account of the severe visitation at Hamburg. This epidemic did not enter the United States, though cases were brought to the port of New York.

While the western spread of the disease from India has attracted more attention from the medical profession in America, eastern diffusions have also occurred to the Straits Settlements, Siam, China, Japan, and the Philippine Archipelago. It has been observed that preceding spread of the disease from its habitat in India that country has always suffered from an unusually violent outbreak.

Cholera has probably existed for many years in endemic form in China as well as in India, though lack of investigation of health matters in the former country has led to few reports of the disease.

The history of cholera in the Philippine Islands is rather meager. Two epidemics have occurred in recent years, the details of which have been obtained from native physicians who were practicing their profession in the islands at the time the disease appeared. The first and most serious was in 1881 and 1882, and is said to have caused some 34,000 deaths in Manila alone. The disease was not recognized as cholera, or at least was not officially announced as that disease, until a major of engineers died in August, 1882. It had then been so widely spread that more than 1,500 deaths occurred in one twenty-four hour period. This epidemic entered by way of Manila and extended thence into the provinces. It terminated after a severe typhoon late in 1882. In 1887 the second Philippine epidemic entered by way of Tawi-Tawi, gradually extended north, killing about 50 per cent of the population of Zamboanga, attacked the islands in turn, at last reaching Manila, to linger during March, April, and May, 1888.

The late history of cholera is as follows: The disease was reported from India alone in January, 1900, but on January 1, 1901, had extended to Madras and the Straits Settlements. Between November 8, 1900, and March 16, 1901, 272 deaths occurred in Singapore. Buenos Ayres had 2 cases between February 1 and February 28, 1901, while in the weekly report of March 9, from Hongkong, 7 deaths were recorded. In India, from November 18, 1900, to March 18, 1901, 1,150 deaths occurred; 68 were reported from March 22 to March 28. Madras during the same time reporting 4. The disease attacked Batavia on June 2, 1901, and gave a total of 538 cases with 451 deaths up to September 28. Yokohama was attacked the same summer, but from July to August had but 8 cases and 3 deaths. A few cases also occurred in Formosa, while at Suez, in September, there were 6 cases and 1 death on a ship from Java. In the cities of Soerabaya and Samarang, of this island, nearly 3,000 cases were reported in the month of August. Borneo also showed 100 cases during the same period, and Sumatra about 90. Singapore, from October 1 to November 23, had 34 cases. These records are of interest in showing the gradual extension of the disease to points having commercial relations with this archipelago.

Exactly by what route the present epidemic entered Manila is not known. The disease has been ravaging Canton during the first part of 1902; thence it spread to Hongkong. Numerous other Chinese cities were undoubtedly affected. No vegetables were permitted imported from infected Chinese ports after March 5, 1902, but large quantities of such vegetables were thrown from ships in the harbor, and it is believed by the Manila board of health that natives living on the water front became infected from vegetables which they picked up on the shore. The other possible means of infection were by Chinese smuggled into the city, infected cloth-

ing from Hongkong, or possibly by persons who had entered legally, and while not apparently affected by the disease had the spirilla in their stools.

The district first attacked was a small barrio called the Farola, immediately above the light-house at the mouth of the Pasig River. This is a typical plague spot, the houses being built partly over the water, with no means of disposal of excreta, which, with garbage, is left on the shore by the receding tide. The greater part of the drinking water of the inhabitants was obtained from the Pasig River, which is foul with the drainage of the entire city.

The first case was reported at 2.30 p. m., March 20, 1902; before midnight that same night four cases had been found. A gradual increase has occurred to March 27, 1902, a total of 63 cases and 48 deaths having been discovered. The manner of the attack shows that there can be no general infection of the municipal water supply, but that some other cause must be in operation.

Cause.—Asiatic cholera is caused by the comma bacillus of Koch, the spirillum of cholera, which, growing in the intestines, gives rise to the characteristic symptoms of the disease, both by the production of toxins and by local action. Koch investigated the comma bacillus in Egypt in 1883, and in India the next year, fully confirming his former observations, nor could he find the bacillus in other diseases or in healthy stools. Koch's researches have been verified by numerous observers, though on account of variation in the character of the spirillum and the fact that spirilla closely resembling those of cholera have been found in other diseases considerable controversy has arisen.

The cholera spirilla are small organisms, 1.5 to 2 micromillimeters in length and a little less than 0.5 micromillimeters in thickness. They are curved like a comma; hence the name. Two attached may give an S shape. Longer forms occur, though more commonly in cultures than in the intestines.

In films from the intestinal contents, in typical cases, organisms are found in almost pure culture, all with their long axes in the same direction, to which characteristic arrangement Koch called attention, comparing it to fish heading up a stream.

Cholera spirilla are flagellated, usually having but one delicate flagellum, and are actively motile. They do not possess spores. In old cultures there is much variation from the typical form, the so-called involution forms.

The spirilla stain readily with the basic aniline stains; Loeffer's methylene blue or weak carbol-fuchsin being especially satisfactory. They are decolorized by Gram's method.

In the body they are found only in the intestines and are never present in the blood or internal organs. The lower part of the small intestines is their favorite habitat. While, as stated, they are never found in the blood or internal organs, they do penetrate the intestinal wall, even to the connective tissue. Coincident with such penetration, the mucosa becomes congested, especially around Peyer's patches and the solitary follicles, which are swollen and prominent. In the chronic cases there may be extensive necrosis of the mucosa, hemorrhage, and the formation of false membrane.

The comma bacillus grows freely on all ordinary media, the body temperature being the most favorable; below 16° C. death usually follows.

A fairly characteristic appearance is given on gelatin plates. Minute white points are visible in twenty-four to forty-eight hours; these under low power show an irregularly granulated or furrowed outline, becoming larger, they give an appearance which has been compared to pieces of broken glass. Later liquefaction occurs and the colonies sink into the cup so formed. The outline of the cup is sharp; the liquefied portion within forms a ring which is granular, while the mass of growth in the center is irregular and broken at the edges. Later, with the continued liquefaction, the characteristic appearance is lost.

Another characteristic reaction, though unfortunately not pertaining solely to the cholera bacillus, is the so-called cholera red. To obtain this add a few drops of pure sulphuric acid to a twenty-four-hour culture, at 37° C., in peptone bouillon or solution of peptone 1 per cent; a pinkish red color results by the reaction of the sulphuric acid with the indol and nitrite formed in the medium, giving a nitroso-indol body. It has been found that all peptone will not give the reaction, and it is advisable when possible to try the peptone with a known cholera culture before using. The sulphuric acid must also be pure. This test is important, is always given with the comma bacillus, and the other organisms which also give it are few in number.

The spirilla grow best in the presence of oxygen, but will grow more slowly without it.

The rapidity of the growth of the cholera organism on all media is of importance in separating it from other bacteria which somewhat resemble it. This growth is especially rapid in alkaline bouillon and peptone solution. In the former at 37° C. in twelve hours the medium becomes turbid and a thin pellicle forms on the surface.

The powers of resistance of cholera spirilla correspond closely to those of other spore-free organisms; they are killed within an hour by a temperature of 55° C. and more rapidly at higher temperature; neither are they resistant to antiseptics, lime (1 per cent in water) destroying them within the same period. Their resistance to cold is greater, although a few days in ice kills them.

In sewage water they do not increase, but live for some time; in distilled water they may live for several weeks, but do not multiply unless considerable organic matter is added; on moist linen they multiply rapidly. Experiments show that in fluids generally when grown with other bacteria, although they increase at first, they are finally overcome by the other organisms.

The conditions governing their saprophytic existence are of great importance from a hygienic standpoint, and as a general statement a warm temperature, moisture, oxygen, and a supply of organic matter may be said to favor their growth, and there can be no doubt that they can and do exist for a considerable time outside the body, thus keeping up and spreading cholera epidemics.

Cholera is not a contagious disease any more than is typhoid fever, which is spread by the same means, and therefore in cholera, as in typhoid fever, in order to study means of infection it is necessary to examine solely agencies by which the bacillus is conveyed to the well from the dejecta of the sick. Transference by means of dust is, however, more unlikely in cholera than in typhoid, as the cholera spirillum is more easily killed by drying than is the typhoid bacillus, and can not be carried through the air. While cholera and typhoid are thus compared and the statement made that cholera is conveyed from sick to well by practically the same means as enteric fever, familiarity with the latter disease should not minimize in thought the danger of infection in the presence of cholera, which is considerable.

Cholera is spread by drinking water infected with cholera excreta; the use of infected water for diluting milk, for washing cooking utensils or dishes, etc., on which food is served, or for washing clothes by which such utensils, dishes, etc., are wiped; flies which carry the spirilla from infected dejecta to food (the organism has been found in flies twenty-four hours after contact with such dejecta); in nurses and washerwomen, direct conveyance of dejections from the patient or his clothing to the mouth; food accidentally contaminated by handling; vegetables and fruits sprinkled with infected water or manured with human excreta; shellfish taken from infected waters.

The home of cholera is also the home of poor water, and in India there is unquestionably repeated infection of water supplies.

It must not be thought, however, that every person who drinks infected water or injests the spirilla is attacked by the disease, for this is far from the truth, as individual susceptibility varies within wide limits. A comparative immunity is enjoyed by those who have an active gastric digestion and a healthy intestinal mucous membrane, and all factors which tend to interfere with this healthy condition just so much make persons more liable to cholera infection. These factors may be heavy drinking, the eating of indigestible foods or overripe fruits, or the use of inordinately large quantities of ice water, etc. As in many other diseases, the resident possesses a certain immunity over the new arrival in an infected locality.

While methods of infection in cholera are the same in these islands as elsewhere, some knowledge of local conditions is necessary in order to effectively combat the disease. As is well known, the inhabitants of the Philippine Islands universally drink impure water; there are no municipal water systems except in Manila and Jolo, and the numerous streams of the archipelago serve all purposes, the population utilizing them for defecation, washing of bodies and clothing, and for drinking and washing of cooking utensils; nor are the municipal water supplies much less dangerous. The whole drainage of the Mariquina Valley is into the river which supplies Manila, not less than 10,000 people living on that stream above the intake. The water is not purified by filtration or other method, and has been found to contain 800,000 colonies per c. c. a short distance above the intake. This number is somewhat diminished by the time the water reaches the city. It is stored for a short time in the reservoir at El Deposito, and in that way loses some bacteria by sedimentation.

Vegetables grown in the islands are necessarily sprinkled with contaminated water, perhaps in addition fertilized with human excreta, and in the presence of cholera are dangerous.

Locally, aerated waters and sorbete, of which the natives are so fond, are also very likely to convey cholera infection. Aerated waters are prepared from any water which is not too dirty to affect the appearance of the product. Since American occupation the factories in Manila have improved, and were at one time provided with filters, either the Berkefeld or Pasteur, but as obtaining water from such filters is rather a slow process, it is believed that they are generally used only during visits

of inspection. Moreover, they are not cleaned frequently, thus giving an opportunity for the spirillum to grow through them.

It is not generally appreciated what a large business aerated-water manufacture is in the city of Manila. There are over 20 firms engaged in making such water, and the capacity of the largest concern is some 20,000 bottles per day.

Sorbete, the native ice, is made from well water, or, more commonly, since the Government ice plant, around which venders congregate, has been in operation, from either city water or that of the Pasig River. As soon as the ice is prepared it is peddled through the streets and is unquestionably dangerous.

From an infected locality cholera may be carried to another place by cholera-infected rags, cholera-infected food, or by man infected with cholera.

The first two methods need no further discussion, but man may undoubtedly carry the disease, although he himself may not be affected by it, or apparently not affected, as a man from an infected area may present no symptom of cholera clinically, though on bacteriological examination the spirillum may be found in the feces, and will just as surely infect a water supply as though from the feces of a person with a typical attack.

Two different manifestations of the disease occur. If a public water supply is infected, a widespread epidemic may be looked for among those who drink the water. If, on the other hand, the organisms do not gain access to the public water supply, they may be deposited near the habitations of the people and give rise to small, confined outbreaks of the disease, so-called cholera nests. Some only local cause is in operation in this variety of the attack; it may be a certain well, infected vegetables only consumed in the locality affected, etc.

The predisposing causes of the disease are not notable; places near the sea are more liable to attack, and high temperature favors development, but any factor which favors the infection of water, foods, or clothing favors the disease, and the better the sanitary condition of the city is, especially in regard to water supply, the less likely it is to be attacked. This was clearly shown in the Hamburg epidemic, when within three months that city had 18,000 cases of cholera, while Altona, separated only by the width of a street, practically escaped. Both cities derived their water from the Elbe, but Altona had in operation a modern scientific system of municipal filtration, while the inhabitants of Hamburg were supplied with unfiltered water.

No age is exempt from cholera, but hard drinkers, the inadequately fed, and those debilitated by bad surroundings are more liable to attack. Fear has also a great influence, probably by diminishing the amount and acidity of the gastric juice. One attack does not secure immunity.

Prevention.—If the dejections and vomit of every cholera patient could be thoroughly disinfected, the disease would be soon stamped out; either a 4 per cent of chloride of lime solution or 5 per cent pure carbolic acid solution is effective, being put in the vessel before the stool is received, in sufficient quantity to cover it.

The vomited matter does not contain spirilla in large numbers, but should receive the same treatment. Clothing which has been in contact with the patient must also be disinfected with the carbolic solution, as infected matter may be conveyed to the mouths of those handling it. The hands of nurses and washerwomen should not be introduced into the mouth, and before eating or smoking should be washed and disinfected for five minutes in a 1 to 1,000 solution of bichloride.

Practically it is impossible to disinfect all excreta containing the cholera spirillum, cases escaping such disinfection just as typhoid cases do, and water supplies should be carefully protected from accidental contamination, or if this be impracticable, systems of municipal filtration installed or other means taken to render the water safe when supplied to the consumer.

Great Britain has been successful in protecting herself from inroads of cholera by general sanitation, especially looking to protection of water and food supplies. The measures put in operation by that country have practically done away with the necessity for quarantine, with consequent loss and inconvenience to merchants and travelers, and constant danger from evasion of quarantine regulations. Only ships which have or have had cholera on board are detained, and then only for disinfection; cholera cases are isolated in hospitals especially set apart; the rest of the passengers are given free practique, though they are kept under supervision during the period of incubation. A careful watch is also kept, especially in seaport towns, for suspicious cases, which, when found, are isolated with disinfection or destruction of fomites. At the same time no articles which may have been infected with cholera are permitted imported, except after efficient disinfection. An attempt has been made to institute like measures in India, with some benefit in certain localities.

While there can be no doubt that the English methods are effective and can be practically carried out in civilized communities, the time is not yet ripe for depending solely on such measures in this country, and for protection of the inhabitants strict quarantine measures against infected localities are imperative.

All passengers from infected ports should be detained at least five days in quarantine, separating all suspicious cases and disinfecting their excreta as though they were surely cases of cholera; passengers' effects should be disinfected, vegetables which are not thoroughly cooked in preparation for the table destroyed or returned, without allowing them to be landed, and all rags or worn clothing which have been shipped for import burned. For other articles discretion should be used: if they can be satisfactorily disinfected without question they may be admitted, otherwise excluded, as sanitary conditions here are such as to demand that no risks be taken. If cholera has occurred on the vessels anything which may have been infected must be disinfected and practically the measures above specified carried out. Intercourse between infected and uninfected towns should be governed by the same rules.

All towns in the archipelago should be at once put in good sanitary condition, and the natives instructed as far as possible in the necessity for boiling their water. It is regarded as hopeless to obtain a pure water supply in any great number of places, but if that can be done immediate advantage should be taken of the fact.

On the appearance of the first case of cholera in a town, by careful disinfection of dejecta, clothing, etc., as noted above, it should be made sure that at least there is no further spread from that case. All water consumed in the town must absolutely be boiled to insure safety, as well as all vegetables not cooked in preparation destroyed to prevent infection. The patient should be isolated in his house with necessary attendants, and the rest of the contacts placed in a detention camp for five days, as must the attendants after the recovery or death of the patient. If death occurs the body should be buried far from a water course in chloride of lime.

It is not necessary to establish cholera hospitals at a great distance from other hospitals or habitations, simply far enough so that persons in the vicinity can not infect themselves directly from the dejecta or vomit of cholera patients.

In the presence of cholera, individuals should protect themselves by correcting any sanitary faults about their own dwellings, by removal of any accumulations of organic matter, or disinfection by 4 per cent chloride of lime, if they are not removable; by disinfection of all privy vaults and cesspools with the same solution in the proportion of 10 parts to every 100 parts of the contents of such vaults; by exclusion of flies from vaults. The scattering of chloride of lime on the ground is of little or no value; it must be used in the form of a solution, and in quantities sufficient to come in contact with all infected material. Of the first importance, however, are measures to prevent any infected matter from being taken into the mouth. No water which has not been boiled or distilled should be used, nor vegetables which are not thoroughly cooked when served, and all kitchen dishes and clothes should be washed in boiling water or boiled, and all food should be protected from flies.

As further measures everything which tends to keep the individual in most healthy condition is demanded. The danger of heavy drinking, etc., has been alluded to. Exposure to the tropical sun, overfatigue, etc., are important, as is also immediate treatment of a slight diarrhea.

The well-to-do in the Philippines, including most of the Americans and Europeans, are protected from cholera in a measure by the better sanitary conditions under which they live. Danger for them lies mainly in the carelessness of ignorant or irresponsible native or Chinese cooks and servants, and personal supervision of their kitchens is necessary if they do not wish carefully boiled water cooled by the addition of unboiled, the exposure of food to flies, the use of infected water in washing dishes, and the wiping of dishes with infected rags.

The prophylactic value of Haffkine's anticholeraic inoculations has not been proved, although extensive use in India has, on the whole, been attended by favorable results. The method of preparation is by passing a culture through a series of guinea pigs by intra-peritoneal injections, in this way increasing the virulence of the culture until such virulence can be no further augmented. An agar slant is then inoculated with the virulent culture, which is allowed to grow at 40° C. for twenty-four to thirty-six hours, the tube being used when the whole surface of the slant is uniformly covered with the growth, a solution being made by filling the tube one-third the height of the agar with sterilized water and shaking until all the growth is washed from the agar and suspended in the water. Half a cubic centimeter of this suspension is used for the injection.

Considerable edema and tenderness are produced at the site of the injection; the constitutional effects are marked by fever and general indisposition, the fever lasting about thirty-six hours, while the local effects do not disappear for four or five days.

Morbid anatomy and pathology.—There are no characteristic pathological changes in cholera. From the profuse diarrhea and the consequent loss of water, the body is shrunken, with all its structures very dry. Rigor mortis is early and gives rise to displacements of the limbs, which during cholera epidemics have been taken as indications that persons have been buried alive; the fact that there is not infrequently a

post mortem rise of temperature going to confirm this belief. The heart is flabby, the right chamber distended with dark blood, while the left is empty; the lungs are collapsed with some congestion at their bases. No special changes are noted in the stomach, but the peritoneum is sticky. The small intestines contain the characteristic rice-water material loaded with the spirilla.

The coils of the intestines are shrunken, while, as before stated, the mucous membrane is congested. The spleen is not changed, except in being somewhat smaller than normal, but the liver and kidneys are both affected with cloudy swelling, the kidney showing in addition coagulation necrosis and loss of epithelial cells. The pathological changes given are those of the ordinary rapidly fatal case of cholera. In those who die after the stage of collapse the inflammation of the intestines is more marked, as are the changes in the liver and kidneys.

Symptoms.—The incubation period is short, from two to five days. Cholera attacks in one of two ways, either with a premonitory diarrhea or suddenly without preliminary symptoms.

Three well-marked stages are usually observed: Premonitory diarrhea, stage of collapse, and reaction period.

Diarrhea is common during cholera epidemics—whether it exists in those cases which are followed by cholera, as a preliminary stage of true cholera, or whether the existence of the diarrhea induces cholera by impairing the resistance of the intestinal mucous membrane, is not evident. There may be other prodromata, such as headache, malaise, depression of spirits, etc. There may or may not be fever.

In any event, with a premonitory stage of one or two days, or suddenly the sufferer enters into the stage of collapse; profuse liquid passages follow each other with great rapidity, painlessly or with griping and tenderness. These passages at first contain fecal material, but soon assume the characteristic rice-water appearance, consisting of a serous fluid with white flocculi in suspension; accompanying these passages, which are very large in amount, there is a sense of exhaustion, and the thirst becomes extreme, while from the loss of water in the muscles cramps occur, especially in the legs and feet. Early, or sometimes not until a few hours have passed, vomiting sets in, first of the contents of stomach, but afterwards of the same serous material passed by the bowels.

With the continued diarrhea and vomiting the muscular cramps become more severe, the muscles of the abdomen and limbs becoming rigid or thrown into knots. The patient now passes into collapse; he is hardly recognizable, the cheeks falling in, the nose becoming pinched, and the eyes sunken; at the same time the body becomes cold and livid with clammy sweating, the secretions, especially bile and urine, are suppressed, the respirations rapid, and the voice almost inaudible; the pulse begins to fail, becoming thready, weak, and rapid, even to be entirely lost at the wrist. The surface temperature is much reduced, 93° to 94° F., while at the same time in the rectum it may be elevated to 101° F. to 105° F. That restlessness so often seen in severe hemorrhage from lack of blood supply to the brain is marked, the patient throwing himself from side to side. Thirst is intense, the cramps become more severe, and there is a burning pain in the chest. The mind may remain clear, may wander, or the patient may become comatose. This is the so-called algid stage of cholera and may terminate in death, rapid convalescence, or the reaction stage.

When death occurs it may be within two hours from the onset of the disease, or the sufferer may linger for thirty hours, though ten or twelve hours is the usual duration of cholera.

When the patient enters into the convalescent stage there is an abatement of all symptoms, with the return of the secretions, and in a few days the patient may be practically well. However, the typical case which recovers enters into the reaction stage. At first this is characterized by the same symptoms as the stage of rapid convalescence, but with the subsidence of the alarming symptoms of the stage of collapse fever develops. This fever may be transient, disappearing in a few hours, or cholera typhoid may supervene. The duration of this cholera typhoid may be from four or five days to two weeks. This state in cholera is as seen in other diseases—sometimes there are severe hemorrhages from sloughing of the mucous coat of the intestines. During the stage of reaction death not infrequently occurs, sometimes from asthenia, but often from such complications as pneumonia, enteritis, or uræmia.

Many variations occur from the typical case described.

Very high temperatures are occassionally noted, even to 109° F., in the rectum. All such cases die.

Ambulatory cases are not uncommon and are characterized merely by diarrhea and malaise, often without cramps and without the development of a stage of reaction. Cholerine is somewhat more severe in its symptoms, the diarrhea being more acute, the stools having the true rice-water appearance, but without any suppression of urine following or other dangerous symptoms.

The term cholera sicca has been applied to those very severe cases where death occurs from the overwhelming of the organism by toxins before diarrhea begins; collapse sets in very early, and such cases are likely to be mistaken for some other disease—as, for example, bubonic plague, when that disease coexists in a locality—but on post-mortem the characteristic rice-water material, swarming with the cholera organism, is found in the intestine, whence from the rapidity of the attack it has not been voided during life.

Sudden death occurs not infrequently in typical cases of cholera from asphyxia, caused by the coagulation of blood in the right heart or by spasms in the pulmonary arteries, the weak heart not being able to force the thick blood through the narrow arteries.

Cholera has important sequelæ: Anæmia, mental and physical debility, chronic entero-colitis, nephritis, pneumonitis, parotitis leading to abscess formation, ulceration of the cornea, bed sores, localized gangrene, etc.

The occurrence of jaundice is almost invariably fatal; pregnant women nearly always miscarry, the fetus having cholera. Like other epidemic diseases, cholera varies greatly in severity in different cases and different epidemics. Fifty per cent is the average mortality, but in the beginning of an epidemic it is usually much higher.

Differential diagnosis.—During an epidemic of cholera diagnosis does not usually present great difficulty except in atypical cases of cholera sicca or ambulant cases. The first cases of cholera appearing in a town, however, are frequently not recognized as that disease, thus leading to infection of water supplies, food products, etc. It is therefore necessary for every physician to examine carefully all cases of diarrhea when cholera is present in the vicinity.

The diseases most likely to be mistaken for Asiatic cholera are cholera nostras, diarrheas, mushroom poisoning, poisoning by arsenic, the early stage of trichinosis, and pernicious malarial fever. Cholera nostras not infrequently can not be differentiated symptomatically from the Asiatic variety, occasionally cases dying in as brief a period as from true cholera, with identical symptoms, nor is the examination of a slide from the dejecta always conclusive, although the diagnosis of Asiatic cholera may be made from such examination in 50 per cent of all cases, the comma bacillus being found in the usual arrangement. The presence of the proteus vulgaris indicates cholera nostras. If this examination of the dejecta does not establish the diagnosis, resort must be had to cultures, and an absolute diagnosis can not be given for about twenty-four hours. Cultures should be made both on gelatin and for the cholera red test, both of which have already been described. Diarrheas due to ptomaine poisoning, unripe fruits, and other intestinal irritants simulate Asiatic cholera and may even require differentiation by cultures.

Examination of the stools is of the first importance in differentiation from the other affections mentioned, with cultures when necessary. Moreover, the blood serum of cholera possesses agglutinative properties even up to a dilution of 1 to 120. This test is made exactly as Widal for typhoid and is equally conclusive, but is not usually given until the second or third day of the disease.

The stools in mushroom poisoning show often pieces of the mushroom. In trichinosis the adult trichina may be found; also a noticeable increase in eosinophiles in the blood.

In arsenic poisoning the usual chemical tests for arsenic are easily made, and the plasmodium can be found in the blood in pernicious malarial fevers. A fact already mentioned should not be lost sight of in examinations in the dejections of persons in a cholera district, and that is that spirilla may be found in normal stools of healthy persons. As far as sanitary measures are concerned, these must be treated as cholera.

Treatment.—All cases of diarrhea should have appropriate treatment in the presence of cholera. In India it has been found of value to establish dispensaries, where medicines for diarrhea are gratuitously distributed. In this way cases of true cholera are likely to be discovered. In these islands as a further measure house to house inspection must be made, as the indifference and ignorance of the population will lead to concealment of the sick.

The drugs used in the treatment of preliminary diarrhea may be left to the individual preferences of the physician. Chlorodyne, or chlorodyne and brandy have been found especially useful; lead and opium pills, chalk, catechu, dilute sulphuric acid, etc., have all been used. With marked abdominal pain and little diarrhea morphine should be given hypodermatically, and when true cholera is established drugs by the mouth should be avoided as they are likely to increase the vomiting. Ice and brandy, or hot coffee, may be given in small quantities, and water in small sips may be drunk when they do not appear to increase the vomiting, which is extremely difficult to check, cocaine and calomel in minute doses—one-third grains—every two hours having been used with benefit in some cases.

The patient should be kept warm in bed and absolutely allowed to do nothing for himself; a warmed bedpan should always be used to receive the stools, and hot water bags packed around the sufferer; on failure of the pulse, hypodermic injections of ether, brandy, or strychnine should be given.

From the great loss of fluid, its replacement with normal salt solution by intravenous or interstitial injection is indicated. This solution is useless in small quantities; from 1 to 3 quarts should be given at a temperature of 100° F. Care should be taken that the solution does not become reduced in temperature before the last of it is injected, as is very likely, as it must be given slowly. The normal salt solution tablets may be used, or a 0.6 per cent solution of common salt in sterile water. The bag in interstitial injections should be elevated about 3 feet above the point of injection. The abdominal wall, flanks, or the loose tissue under the breasts are the best sites for such administration. Irrigations of the bowel have been recommended; as the seat of the disease is in the small intestines, a long, soft tube must be used, passed in gently as far as possible; 2 per cent tannic acid has supporters, as have also very weak solutions of permanganate of potassium.

In the reaction stage, if diarrhea persists, intestinal antiseptics with opium are of value, and tannin in rectal injections is also useful. For suppression of urine, hot cloths or dry cups over the loins and bland diuretics may be resorted to. The bladder must be watched and the catheter employed when necessary.

For some time after an attack of cholera the diet must be regulated just as after typhoid. Cholera typhoid is treated as is the typhoid condition due to any other disease.

CIRCULAR No. 2.

HEADQUARTERS DEPARTMENT OF SOUTH PHILIPPINES,
Cebu, Island of Cebu, P. I., March 29, 1902.

The remarks and recommendations contained in the following letter of the acting chief surgeon of the department are approved and will be strictly complied with by all concerned.

By command of Brigadier-General Wade:

C. J. CRANE,
Major of Infantry, Adjutant-General.

HEADQUARTERS DEPARTMENT OF SOUTH PHILIPPINES,
OFFICE OF THE CHIEF SURGEON,
Cebu, P. I., March 28, 1902.

SIR: In view of the recent appearance of Asiatic cholera in Manila, and of the possibility of its extension to this department, I have the honor to recommend that the following be published for the information and guidance of all concerned:

It should be clearly borne in mind that cholera is caused by a specific germ found in the bowel discharges and to a less degree in the vomitus of infected patients, the spread of the disease among healthy persons being due to the contamination by these infected discharges of articles of food and drink. The chief end in view, therefore, should be the prevention of such contamination. As cholera germs are capable of living and multiplying for a time outside the body in the presence of decomposing organic material, there should be a thorough removal of every sort of filth and refuse from the camp or garrison, and in general the same precautions regarding the care and disposal of excreta should be taken as in case of an epidemic of typhoid fever.

Since water is perhaps the chief agent in the spread of the disease, its contamination should be especially guarded against. This may be effected by boiling, filtering, and distilling. It is also necessary to guard against subsequent contamination of such sterilized water as may be stored in open vessels, which is likely to occur by contact with unclean hands or utensils, by dust containing the specific germs, or by the agency of flies and other insects which have recently fed on cholera discharges. Sterile water should be used not only for drinking purposes, but also in the preparation of food and in the washing of dishes and cooking utensils.

In the preparation of food care should be exercised to prevent its contamination by unclean hands, and especially by flies and insects. If possible, kitchens should be screened, and food in storage protected by netting or other means.

The fresh beef supply should be carefully watched and such measures taken as will prevent contamination by the access of flies or other agencies, particular attention being given to freshly killed beef and to its transportation and delivery to troops.

Native vegetables and fruits should be avoided whenever there is a possibility that they may have been contaminated by polluted water or infected discharges.

All articles of food should be thoroughly cooked, and such articles as lettuce, radishes, and the like, which are usually served uncooked, should be scrupulously avoided.

During an epidemic great care should be exercised to preserve the general health. The enlisted man should be instructed carefully to guard against dietetic and alcoholic excess, and all articles of food tending to upset the digestive organs and to cause intestinal disorders avoided. Native bottled drinks are especially dangerous.

Personal cleanliness should be strictly enjoined, especially a thorough scrubbing of the hands in soap and water before each meal. Water for bathing purposes should be pure.

In the event of an outbreak of cholera in a town in this department occupied by troops, the surgeon is expected to make such recommendations in detail to the commanding officer as will enable him to carry out measures necessary for the protection of the health of the command.

Respectfully,

HENRY A. SHAW,
Captain, Medical Department, U. S. Army, in Charge of Office.

The ADJUTANT-GENERAL,
DEPARTMENT OF SOUTH PHILIPPINES.

NOTES FOR BOARDS OF HEALTH IN SECOND SEPARATE BRIGADE.

From reports to this office it is learned that whereas many pueblos have been organized as to sanitary matters in the present cholera emergency, there has been some misunderstanding as to General Orders, No. 66, Headquarters Division of the Philippines, dated March 25, 1902, and the following tentative notes are issued as a guide for medical officers in this brigade, who will at once take charge of sanitation and quarantine of this territory:

1. Every death, with cause, and all sickness to be reported. If no physician has certified to the cause of death, medical member of board should investigate.

2. If the death is cholera, the body should be burned if practicable; otherwise buried in special lot near cholera hospital.

3. When cholera appears, select an isolated camarine, church, convent, or house for pesthouse, to which every case is taken as soon as reported. Organize a corps of practicantes, nurses, and cooks to care for sick, and telegraph for medicines and disinfectants to Manila Board of Health.

4. An isolated barrio must be vacated as an isolation camp, to which the families are to be transported from houses in which cholera has appeared, and they are to be confined there for six days after the last case appears in that family, food and fuel being taken to them. Municipal police will establish quarantine guard around this barrio, permitting no intercourse whatever.

5. The house vacated is to be burned, but if too dangerous to do this it must be cleaned up by cleaners employed by municipal board of health and sprinkled with 5 per cent solution of carbolic acid in and out and on the ground under the house. (The dry germ is dead and the hot, dry dust around the house is harmless.)

6. The pueblo in which cholera appears must be isolated by quarantine guards (preferably constabulary) at all roads and streams, who must not allow anyone to pass (on foot, in boat or carriage) without a permit signed by a member of the municipal board of health.

7. All intercourse with the provinces south of Pampanga must stop, except for persons holding a pass signed by a member of a provincial board of health or an army surgeon, and such passes must not be given to any native if cholera has appeared within 100 feet of his house. When in doubt, refuse the permit. No permit is good for more than twelve hours after being signed, and not good if no time is mentioned on it.

8. Sanitation must begin at once. For the present, native inspectors should go from house to house directing people (*a*) to clean up and burn all refuse, particular attention being paid to damp places under houses; (*b*) all cesspools must be closed up, no feces allowed to remain near a house. Each family must burn or bury this if possible; if not possible, in centers of towns feces must be covered with dust and put out in boxes with garbage and refuse to be collected daily in a native cart and buried in a trench one-fourth mile from a barrio. (*c*) Every native must be instructed that the disease comes from water and fresh vegetables and advised to boil drinking water and eat only cooked food. * * * When cholera appears, the natives must be ordered to do this. Warn them that the infection comes from the bowel discharges of the sick getting in their food and water, and no feces should be thrown into rivers or buried near wells.

9. Under every house within 100 feet of the house where cholera appears there must be a smoke smudge kept burning. This does not disinfect, but it helps to dry out the damp; it enhances the cleaning, and it keeps flies from carrying the germs.

10. There is no way of protecting water supplies, as feces will be carelessly thrown into the rivers. Hence the boiling of water is the chief reliance. Removing feces of the well, isolating the sick, and burning the dead will all assist, but not wholly prevent, the spread. It should be well in every cholera-stricken barrio to establish a public boiling station to supply boiled water for everyone who brings a bucket of unboiled.

11. Municipalities must take up these matters under section 39, "L" to "S," municipal code. Provincial boards are recommended to take steps to remove any municipal authorities who do not act. Concealing a death is the most serious offense and should be given a fine of 200 pesos and confinement of three to six months. Concealing sickness deserves 100 pesos fine, retaining feces in or near a house 50 pesos, and filthy conditions 10 pesos.

12. All inspectors, native and American, must be carefully instructed. Some have been found very ignorant of the conditions with which they have to deal. American school-teachers on boards of health can do much good missionary work with prominent natives and school children. Soldiers should be kept in reserve and should not be asked for except in great emergency. American civilian inspectors should be employed if possible, and when cholera occurs they should be asked for from insular board of health.

13. Certain municipalities have no funds for this work, and as the protection is for the benefit of all the islands, it is suggested that such authorities make effort to obtain funds from provincial or insular treasuries.

14. When cholera appears, all municipalities should publicly display in every barrio short notices in native language embodying these rules for natives, with notices of fines.

CHAS. E. WOODRUFF,
Major and Surgeon, U. S. Army, Chief Surgeon.

Approved by command of Brigadier-General Bisbee.

AUGUSTUS C. MACOMB,
Captain, Fifth Cavalry, Adjutant-General.

VENEREAL DISEASES.

In the Army as a whole, with a mean strength of 92,491 men, there were reported during the calendar year 1901 13,911 cases of venereal disease, equivalent to an admission rate of 150.41 cases per 1,000 of strength. These cases furnished 161 discharges for disability, equaling 1.76 per 1,000 men, and 8 deaths, equaling 0.08 per 1,000. These rates are exceedingly high when we compare them with the mean annual rates of the decade 1888–1897: Admission 70.60, discharge 1.71, death 0.03. The rates in the Philippines and in the United States during the past year did not differ much, but those in Cuba were high and those in Porto Rico very high, as may be seen from the following tabulations:

Army as a whole, per 1,000 of strength.

	Admission rate.	Discharge rate.	Death rate.
Syphilis	19.15	1.29	0.06
Gonorrhea	93.90	.45	.02
Chancroids	37.36	.02	.....
Total	150.41	1.76	0.08

TROOPS IN THE UNITED STATES.

Syphilis	19.35	3.21	0.08
Gonorrhea	104.21	1.17	.....
Chancroids	26.40	.04	.....
Total	149.96	4.42	0.08

Army as a whole, per 1,000 of strength—Continued.

TROOPS IN THE PHILIPPINES.

	Admission rate.	Discharge rate.	Death rate.
Syphilis	17.99	0.32	0.07
Gonorrhea	86.38	.12	.02
Chancroids	39.90		
Total	144.24	0.44	0.09

TROOPS IN CUBA.

Syphilis	22.28	1.13	
Gonorrhea	116.48	.76	0.19
Chancroids	48.52		
Total	187.28	1.89	0.19

TROOPS IN PORTO RICO.

Syphilis	59.84	6.07	
Gonorrhea	143.11		
Chancroids	106.68	.87	
Total	309.63	6.94	

The chief surgeon of the Division of the Philippines reported that during the year:

The bimonthly physical examination has limited spread of venereal affections and its continuance should be enforced. Regulation of prostitution has been taken from the hands of the army by the establishment of civil government. While the segregation of syphilis is more necessary than the segregation of lepers, familiarity with the former disease has so much minimized the fear of it in the public mind and in America distaste to recognize the existence of the prostitute is so great, that little will probably be effected. Any fine or decrease of pay in a soldier suffering from venereal disease is to be deprecated as leading to concealment of such disease, which is most undesirable. If a soldier contracts syphilis the question becomes much more difficult than if he suffers from other venereal disease. The long period required for cure, danger to his companions and their fear of him, and not infrequent difficulties in the way of treatment necessitated by a soldier's duties, making it doubtful if it is worth while to retain him in the service. In fact, such a man seldom gives value received for the money the Government spends on him, and it would be better after treatment of the earlier lesions, but without return from the hospital to his company, to discharge him for disability not in the line of duty and give him transportation to his place of enlistment. As an alternative special hospitals may be established for such cases, but it is not fair to the well men of an organization to allow a syphilitic to return to them, living as they do so close together as to give countless chances for extragenital infection. Treatment for a sufficient period in the ordinary station hospital is impracticable.

ALCOHOLISM.

During the calendar year 1901, 2,018 cases were reported from the Army, with a strength of 92,491 men. This is equivalent to 21.82 admissions per thousand of strength, with 10 discharges for disability, equaling 0.1 per thousand, and 26 deaths, equaling 0.28 per thousand. This record compares favorably with that of the Army during the ten years 1888–1897, when the mean annual admission rate was 32.06, the discharge rate 0.04, and the death rate 0.21.

In the United States there were 696 cases, equaling 26.25 per thousand of strength, with 7 deaths and 7 discharges for disability, equaling a

rate for each of 0.26 per thousand men. The admission rate in the Philippines was only 18.48, notwithstanding the sensational reports concerning the use of vino by our troops, the discharge rate 0.05, and the death rate 0.32. In Cuba the admission rate was 35.87, and in Porto Rico 27.75, but there was no death nor discharge from this cause in these islands.

The Chief Surgeon, Department of the Columbia, Maj. R. G. Ebert, surgeon, U. S. Army, states in his report that the habits of the men are not up to the standard which existed prior to 1898 nor to what they were under the old status of the post exchange.

The form in which alcohol is most commonly taken by natives of the Philippines is as vino or vino flavored with anise, the so-called anisado. Natives are rarely drunkards, and comparatively few of them take a great deal of alcohol, their indulgence being limited to an occasional liqueur glass of this vino or anisado. This moderation is practically never seen in soldiers, those who drink vino at all becoming slaves to the habit. Consumption of this liquor has somewhat increased during the year.

Intemperance generally is somewhat more common than before the post exchange was abolished, the greatest amount being seen in men in Manila awaiting discharge or on their way home.

Vino is generally made from tuba, the juice obtained from the buds (unripe fruit) of the nipa palm. Tuba somewhat suggests pulque, and, like the Mexican drink, rapidly undergoes an acid fermentation, so that it must be used soon after collection, whether for drinking or for distillation. The majority of distilleries are therefore located in districts where the nipa palm grows, though vino is made to a less extent from sugar or cocoanut juice. Whichever is used the distilling process is the same and the resulting liquor is a bad one. Stills are of a primitive pattern, consisting of nothing more than a boiler and short worm. Under this boiler a very hot fire is built, bellows not uncommonly being employed to increase the heat. This heat is so great as to not only carry over all alcohols but steam, and the distillate contains less than 20 per cent of alcohol of a bad quality, as it is composed not only of ethyl alcohol, but the lower and higher alcohols—methyl, amylic alcohols, furfurol, etc. This crude product sometimes undergoes a further purification in Manila by redistillation, but while a good alcohol can be made in this way this is not done commercially, and time is never given for changes which age or the various artificial processes simulating age cause.

Since American occupation a number of mixtures made from this impure alcohol have been manufactured with the various essences of brandy, whisky, rum, gin, etc., in numerous establishments, many being made actually while you wait. That these liquors are injurious, both from a physical and mental standpoint, needs no further proof. Vino causes a maniacal acute alcoholism, in which any crime may be committed, and after recovery from a debauch depression is greater than from ethylic alcohol. Repeated overindulgence may act as an exciting cause of insanity in those with a proper predisposition. Melancholia is more common than mania. Practically all habitues become perverted, entering into that state so often seen in morphine fiends of loss of responsibility and inability to distinguish between right and wrong.

The physical effects of such an alcohol are naturally severe and are exerted principally on the stomach, liver, and kidneys from the intensely irritating effects of the raw spirit.

The control of the sale and manufacture of vino is now in civil hands, but measures should be taken to protect the soldiers by making the penalty of selling vino to soldiers heavy, both fine and imprisonment being imposed, by granting no further distilling licenses to mixing shops and by stopping the production of spurious liquors from vino.

INSANITY.

One hundred and sixty-six cases of insanity were reported among the 92,491 men of the Army during the calendar year 1901. This is equivalent to 1.76 per thousand of strength, but as only 142 of these men, equivalent to 1.53 per thousand, were ultimately discharged as insane and committed to the asylum, the record of insanity is correspondingly reduced. Thirty-four cases were reported from garrisons in the United States, and all of these, equaling 1.28 per thousand of strength, were discharged from service and committed to the Government Hospital for the Insane. One hundred and twenty cases, equaling 2.02 per thousand of the strength in the Philippines, came from those islands, but on arrival in this country it was found necessary to send only 100 of these, equaling 1.68 per thousand, to the United States Government Hospital. The home-coming sea voyage and the period of detention at the general hospital, Presidio of San Francisco, Cal., permitted of recovery in a number of instances. Eight cases were reported from Cuba, equaling 1.51 per thousand, but of these only 4 were discharged on this account. Four cases reported from Porto Rico gave the high admission rate of 3.47, all of whom were discharged and transferred to the Government Hospital for the Insane.

The 166 cases of the past year, equaling 1.76 per thousand men, may be compared with 2.72 during the year 1900, with 1.78 in 1899, and with 1.13, the mean annual rate of the decade 1889–1898.

At the general hospital, Presidio of San Francisco, Cal., a small detached building on the eastern portion of the hospital grounds is so fitted up and arranged as to accommodate about 15 patients, and is denominated the detention or insanity ward. It is under the charge of a medical officer, and has three Hospital Corps privates on day and two on night duty as attendants. The patients are kept under observation until their ward surgeon and a board of three medical officers, of which the ward surgeon is a member, are satisfied as to their mental condition, when those who are considered to be insane are recommended to the commanding officer for transfer to the Government Hospital for the Insane, Washington, D. C., while those considered normal mentally are returned to duty or discharged, as the case may be. The length of time required for this purpose is found to average about four to six weeks, and this period of time is usually quite sufficient for the ward to become filled with new arrivals.

One hundred and fifty-eight cases diagnosed as insane were received during the fiscal year—145 from the Philippines, 1 from Honolulu, and 12 from other sources.

Classified according to status in the service, they were as follows:

Regulars	139
Volunteer	1
Discharged soldiers	11
Retired soldier	1
General prisoners	4
Civilians	2
Total	158

Classified as per diagnoses made, the cases were as follows:

Chronic alcoholism	2
Dementia	14
Dementia, secondary	7
Dementia, syphilitic	2
Dementia, chronic	6
Dementia, post alcoholic	6
Dementia, subacute	1
Dementia, simple	2
Dementia, terminal	1
Epilepsy, grand mal	13
Epilepsy, petit mal	4
Epilepsy, traumatic	1
Hypochondria	3
Insanity, delusional	5
Insanity, acute	2
Morphomania	3
Monomania	1
Mania, acute	9
Mania, chronic	2
Mental deficiency, congenital	6
Melancholia, acute	50
Melancholia, chronic	13
Paranoia	4
Paresis	1
Total	158

The following dispositions were made of these cases:

Transferred to Government Hospital for the Insane	91
Returned to duty	31
Discharged on surgeon's certificate of disability	10
Died	1
Deserted	2
Left hospital	5
Discharged on expiration of term of service	5
Escaped (general prisoner)	1
Remaining	12
Total	158

During the year there were received 36 cases diagnosed as insane in which the diagnoses were not confirmed. It is probably true that most of these cases, if not all, were insane at the time that they were transferred to this hospital, but the majority of them came from the Philippine Islands, and the voyage home, together with more cheerful surroundings, resulted in a disappearance of the abnormal condition. Most of these cases are of the types of insanity in which the prognosis is good, and most of them were, without doubt, due to nostalgia and the depressing influence of campaigning in the Tropics.

BUBONIC PLAGUE.

In the Division of the Philippines bubonic plague, which in the year 1900 gave a total of 278 cases in the civil population, and in 1901 some 580 cases, has disappeared for the present. During the early part of the fiscal year three soldiers were attacked, one at Naic and two at Camp Stotsenburg. In cooperation with the Insular Board of Health energetic efforts have been made to catch and kill rats, which in November and December showed about 2 per cent infected with plague, the percentage gradually declining until at the end of January no plague rats were found. In December a case of plague occurred in a teamster employed by the Quartermaster's Department in Manila, in the main corral on Malecon drive. The great precautions taken to prevent spread from this case were attended with success. The patient died after an illness of but a few hours. The observations of the year confirm the opinion previously formed that the plague is not a particularly contagious disease. The experience of Hongkong, from which city the disease has practically disappeared in three different seasons only to recur in the succeeding years, induces caution in the formation of an opinion whether Manila may be regarded as freed from plague or that a recurrence must be expected.

The following case was reported by Capt. Thomas W. Jackson, assistant surgeon, U. S. Volunteers, September 16, 1901, from Naic, Cavite Province, P. I.:

During the night of September 12 a native scout appeared at this hospital complaining of severe, cramp-like pains in the calves of both legs. He was given chloroform liniment as an application by the hospital steward and returned to his quarters, appearing the following morning, September 13, at sick call with a temperature of 103° F. Examination revealed a well-developed left femoral bubo of the size of a small lime, and as no venereal lesion was found he was immediately isolated.

Owing to his lack of knowledge of English and Spanish it was difficult to elicit a complete history, but by means of an interpreter the following facts were gathered: Julian Gonzales, about twenty years old, native scout, quartered with Company I, Fourth Infantry, returned with six other scouts from Magallanes September 9 in good health. He denied having chills, fever, or symptoms of malarial disease or other recent illness.

In the absence of a microscope, malaria could not be excluded. Quinine was administered, and was continued throughout the illness by mouth and needle. Bowels and kidneys performed their functions normally. The bubo increased in size during the first twenty-four hours, attaining a large size. The skin was quite tense, and the bubo moderately tender. At the end of twenty-four hours the bubo began to diminish in size and consistence, but showed no sign of suppuration. It has now almost entirely disappeared. A few inguinal glands and one cervical gland of the same side become slightly swollen, but there was no other manifestation of glandular enlargement. Upon the fifth day the temperature dropped to 99° F., but the afternoon temperature of the same day was 103° F. Upon the morning of the sixth day the temperature was slightly subnormal.

This case was seen twice in consultation by Maj. T. B. Anderson, surgeon, U. S. Volunteers, who declined to express a positive opinion.

District, department, and division chief surgeons were notified by telegram, and the civil health authorities in Manila wired to send an inspector.

Every precaution was taken to prevent contagion. The quarters in which the case occurred were thoroughly disinfected, and the patient was isolated in a tent in the middle of a large field, attended by a native scout, and visited by me three times a day. The commanding officer furnished a guard to prevent unauthorized communication with the patient.

In the absence of a microscopical diagnosis, I inclined to the opinion that the case was one of sporadic plague for the following reasons:

1. The appearance of a femoral bubo without venereal lesion or other near-by skin lesion coincident with acute febrile symptoms is most unusual in cases of malarial

disease. In an experience of two thousand or more cases of malarial disease I have not met with such a combination of symptoms.

2. The onset and progress of the case suggested an acute infectious disease.

3. The recent occurrence in this town of five cases of bubonic plague, three fatal, readily accounted for the origin of the case, the infected buildings still remaining. It is now beyond the power and province of the medical officer to destroy these buildings, the town being under civil rule.

4. The temperature curve might be variously interpreted and was not inconsistent with plague.

September 18: Upon the afternoon of September 17 Dr. J. F. Halsell, representing the Manila Board of Health, made a blood examination of the case under suspicion. No malarial parasites nor pigment was discovered, but plague bacilli were found in several specimens examined, making positive the diagnosis of bubonic plague.

September 19: Case is now convalescent, but under strict quarantine.

According to the chief surgeon, Department of California, a few scattering cases of bubonic plague occurred at Honolulu, Hawaiian Islands. The disease was confined chiefly to the Asiatic and Japanese sections of the city, although sporadic cases made their appearance in various localities. The premises occupied by a case of the disease after its final disposition were thoroughly disinfected, or whenever practicable destroyed by fire.

The troops were not attacked by the disease, due in part to feeble susceptibility and in part to the effective measures taken to prevent the extension of the infection.

BERI-BERI.

An elaborate report on beri-beri as it occurred among native prisoners in the military prisons at Lingayen, province of Pangasinan, was published, pages 236–239 of the last annual report of the Surgeon-General of the Army. During the past year only one report on this subject has been received. This came from Malagi Island, Laguna de Bay, Lieut. S. M. Waterhouse, assistant surgeon, U. S. Army, dated June 20, 1902. On January 20, 1902, Company H, Twenty-eighth Infantry, arrived at Malagi Island with 100 native prisoners and a large amount of supplies. At that time the island was absolutely uninhabited and presented no indication of former occupancy by men, with the exception of one group of banana trees and a small quantity of crushed stone on one part of the shore. The island is about 120 acres in extent, rising at its highest part to about 100 feet above the water level and having everywhere a good natural drainage. On February 28, 1902, among a fresh arrival of prisoners, two cases of beri-beri were discovered. They were immediately isolated.

After this cases continued to appear every few days; and as the authorities refused to allow their removal, the isolation camp continued growing until it contained 24 patients in all stages of the disease. Upon repeated requests by the surgeon, authority was finally given to remove these patients from the island. A careful examination was made of all the prisoners, and 59 more cases were discovered and immediately liberated. Even after this occasional cases appeared on sick report, and a third examination of the entire prison population was made, resulting in the discovery of some 40 additional cases in the earlier stages of the disease. Occasional cases appeared from time to time upon the sick report until the final release of all prisoners on June 4, 1902.

Lieutenant Waterhouse considered that diet had little to do with the propagation of the disease. He says:

The theory of germ propagation and of infection by personal contact and by place infection appears to me to account more satisfactorily for the spread of the disease. To begin with we had 100 prisoners hard at work here for a month and a half with-

out the slightest symptom of the disease; then two cases of beri-beri were introduced, and after that the spread was steady. Again, it was noticed that most of the cases came from one set of quarters, the first set erected, and that the number of cases from that barracks decreased to a marked degree after scrubbing the bamboo floor with a 4 per cent solution of chloride of lime.

Efficient isolation was impossible, owing to the necessarily limited area of the stockade. Most writers claim that beri-beri is due to old, damp buildings, made of stone or of brick, but in this case the conditions were just the reverse, as we had new, airy, spacious barracks, located on high, well-drained ground with a constant stiff breeze and no flies or mosquitoes, conditions apparently ideal for health and the more marked as this epidemic occurred during the dry season, whereas the rainy season is said to be especially favorable to such outbreaks.

The fact that the natives go barefooted and that some of the cases appeared in unfloored tents makes one incline strongly to the possibility of place infection occurring from the ground. Another noticeable fact was that of prisoners sleeping next to one another; if one developed beri-beri the other was very likely to do the same.

From the fact that none of the prisoners had developed beri-beri prior to its introduction here from a known infected point, of the apparent spread by contact, and of the slight influence which diet appeared to exert over it, the presumption is that we are dealing with a disease of microbic origin, prone to attack those in a run-down and mentally depressed condition, and one which is conveyed by fomites and by close personal contact.

That it is not very easily contracted unless all the conditions are favorable to its spread is shown by the complete freedom from infection of the entire white population of the island.

Special medical reports rendered to June 30, 1902.

Name.	Rank.	Reports.
Appel, D. M	Major and surgeon	Pulmonary tuberculosis, 3 cases.
Ashburn, P. M	First lieutenant and assistant surgeon.	Syphilis.
Bispham, W. N	do	"The Anglo-Saxon in the Tropics."
Bratton, T. S	Captain and assistant surgeon	Typhoid fever at Fort Clark, Tex.
Clayton, Jere B	First lieutenant and assistant surgeon.	Report on the distribution of medical supplies to the people of the West Indies, suffering from the effects of volcanic eruptions.
Curry, Jos. J	Captain and assistant surgeon volunteers.	Memoranda of interesting cases.[a] Bubonic plague and surra. Report on the dissemination of surra.
Devereux, J. R	First lieutenant and assistant surgeon.	Report on malarial fevers at Washington Barracks, D. C.
Eliot, H. W	Captain and assistant surgeon volunteers.	Asiatic cholera at Bay, Laguna, P. I.
Espin, J. W	Contract surgeon	Typhoid fever.
Ewing, C. B	Major and surgeon	Report on bubonic plague in the Philippines, India, and Egypt.
Flagg, C. E. B	Captain and assistant surgeon	Auto-intoxication, intestinal. Report of vaccinations, with details of method employed. Tuberculosis. Variola.
Forwood, W. H	Surgeon-General	Report of the Army Medical School, April 30, 1902.
Frick, E. B	Captain and assistant surgeon	Typhoid fever.
Geer, Chas. C	First lieutenant and assistant surgeon.	Ptomaine poisoning.
Gibson, E. T	Contract surgeon	Variola and scarlet fever on transport *Meade*.
Girard, A. C	Lieutenant-colonel and deputy surgeon-general.	Annual report of the general hospital, Presidio, San Francisco, Cal., June 30, 1901. Report of autopsies made September, 1901, to March, 1902.
Greenleaf, H. S	First lieutenant and assistant surgeon.	Diphtheria.
Hartsock, F. M	First lieutenant and assistant surgeon.	Haemoglobinuric fever.
Havard, V	Lieutenant-colonel and deputy surgeon-general.	Report of the proceedings of the Pan-American Sanitary Congress held in Havana, Cuba, February, 1902.
Heller, Jos. M	Major and surgeon, volunteers.	Report of a case of Asiatic cholera.
Himes, B. E	Contract surgeon	Typhoid fever.
Ives, F. J	Major and surgeon	Report of movement of 29th Infantry to San Francisco, Cal., special car for hospital purposes.

[a] Published in "American Medicine," March 29, 1902. Page 512.

Special medical reports rendered to June 30, 1902—Continued.

Name.	Rank.	Reports.
Jackson, Thos. W	Captain and assistant surgeon, volunteers.	Bubonic plague, 3 reports. Diphtheria. Aestivo-autumnal malarial fever, 5 cases.
Kelly, J. P	Contract surgeon	Apoplexy.
Kilbourne, H. S	Major and surgeon	Diphtheria.
Littlefield, N. H	Captain and assistant surgeon, volunteers.	Numerical report of beri-beri cases.
Marshall, T. R	do	Report of Asiastic cholera at the Santa Mesa Cholera Hospital.
Mason, Charles F	Major and surgeon	Pleuro-pneumonia.
Morris, E. R	do	Aortic valvular disease.
Musgrave, W. E	Contract surgeon	Report on sprue and psilosis in Manila, P. I.
Pease, T. D	do	Variola.
Poey, E. C	Captain and assistant surgeon, volunteers.	Ptyalism.
Reynolds, F. P	Captain and assistant surgeon.	Report on Hospital Corps drill, Army Medical School.
Schreiner, E. R	First lieutenant and assistant surgeon.	Variola.
Shimer, Ira A	do	Zoster hemorrhagicus.
Snyder, H. D	Captain and assistant surgeon	Report relative to the American Congress on Tuberculosis, held in New York City, June, 1902.
Steer, S. L	First lieutenant and assistant surgeon.	Variola at Fort Du Pont, Del.
Strong, R. P	do	Reports existence of Asiatic cholera in Manila, P. I.
Torney, G. H	Major and surgeon	Heat stroke.
Wells, Geo. M	Captain and assistant surgeon.	Malarial fevers at Fort Wadsworth, N. Y. Scarlet fever and chicken pox.
Wolfe, E. P	First lieutenant and assistant surgeon.	Typhoid fever, 16 cases. Tuberculosis among recruits.
Wythe, S	Contract surgeon	Variola.
Zeller, G. A	Captain and assistant surgeon, volunteers.	Describes a practice among Filipinos known as "tangkong."

INJURIES.

During the calendar year 1901 there were entered on the reports of sick and wounded of the Army, mean strength 92,491, 17,736 cases, or 191.77 per thousand of strength, with 407 men discharged for disability and 403 having a fatal termination, equivalent, respectively, to 4.40 and 4.36 per thousand of the strength. Of the admission rate, 191.77 per thousand, 147.43 was contributed by the few, mostly native, troops in Porto Rico; 351.90 by the command in Cuba; 168.33 by the troops in the Philippines and China, and 250.08 by the men serving at the home stations.

The large rates in the home stations may be explained on the general principle that in time of peace men report for admission to sick report and excuse from duty for slight injuries which would not lead them to do so if in service of an active or quasi active character. The small rate in Porto Rico may be attributed to the fact that the troops were natives of the island and did not report sick for slight injures.

One hundred and thirteen deaths from drowning were reported, equivalent to 1.22 per thousand of strength; 90 of these, equivalent to 1.47 per thousand of strength, occurred in the Philippines, and 16, equivalent to 0.60 per thousand, in the United States.

Exhaustion from exposure and fatigue caused the entry of 370 cases on sick report, equivalent to 4 per thousand of strength, only one case fatal. In the United States 85 of these cases occurred, equivalent to 3.21 per thousand; in Cuba 6, equivalent to 1.13; in Porto Rico 1, equivalent to 0.87, and in the Philippines 278, equivalent to 4.67, but the only fatal case occurred in the United States.

Heat stroke. Two hundred and seven cases were reported, equivalent to 2.24 per thousand. Of these 9 died and 5 were discharged for disability. It is to be noted that the admission rate for this casualty is greater in the United States than in the tropical islands. In the islands and China there were 120 cases, equivalent to 1.82 per thousand of strength, and of these cases 8 died and 4 were discharged, while in the United States there were 87 cases, equivalent to 3.28 per thousand, but of these only 1 was fatal and 1 terminated in discharge. No case of heat stroke was reported from Porto Rico and only 1 from Cuba.

Of hernia 484 cases were reported, 138 cases, or 5.20 per thousand of strength, among the troops serving in the United States, and 266, or 4.03 per thousand, among those serving outside of the limits of the continent. Eighty-six of these cases were discharged for disability. The following cases operated on or reported as operated on during the fiscal year are added to the lists heretofore published:

Name.	Organization.	Age.	Hernia.	Date of operation.	Operator.
W. F. S.	Pvt., H, 13th Cav.	23	Right inguinal	Dec. 16, 1901	First Lieut. P. M. Ashburn, assistant surgeon, U. S. Army.
H. W.	Civilian	7	do	Feb. —, 1901	
A. T.	do	25	Right femoral	May —, 1901	Maj. John M. Banister, surgeon, U. S. Army.
P. C.	Capt., 11th Cav.		Left inguinal	Sept. 2, 1901	
H. W.	Civilian	7	do	Oct. 18, 1901	
R. P. H., jr.	Cadet		Right inguinal	Dec. 17, 1901	
R. B. McK.	Pvt., 14th Coast Arty.	24	Left inguinal	July 16, 1901	
C. H. B.	Pvt., 37th Coast Arty.	34	do	Sept. 24, 1901	
C. R.	Sgt., 37th Coast Arty.	26	Right inguinal	Sept. 27, 1901	
S. B. H.	Pvt., 6th Coast Arty.	25	do	Oct. 8, 1901	
W. B. F.	Mus., 35th Coast Arty.	38	do	Oct. 11, 1901	
F. C. W.	Pvt., Hospl. Corps	19	Double inguinal	Nov. 1, 1901	
H. L. H.	Major, Arty. Corps	55	do	Nov. 12, 1901	
W. H. A.	Pvt., 1st Coast Arty.	26	Left inguinal	Dec. 7, 1901	
E. J. W.	First lieut., 5th Inft.	29	do	Dec. 21, 1901	
L. M. M.	Com. Sgt.	39	do	do	
C. H.	Pvt., 80th Coast Arty.	24	Right inguinal	Feb. 22, 1902	Maj. W. C. Borden, surgeon, U. S. Army.
W. H. W.	Pvt., 73d Coast Arty.	23	do	do	
J. H.	Pvt., 27th, Batty F, Arty.	21	do	Mar. 1, 1902	
G. R. B.	Pvt., 102d Coast Arty.	31	do	Mar. 28, 1902	
F. W. R.	Cpl., 108th Coast Arty.	26	do	Apr. 11, 1902	
C. S. M.	Pvt., 103d Coast Arty.	23	Left inguinal	Apr. 25, 1902	
B. B.	Pvt., 23d Batty. F. Arty.	23	Right inguinal	May 9, 1902	
J. P. C.	Pvt., 58th Coast Arty.	30	do	May 16, 1902	
H. G.	Second lieut., 22d Inft.	28	do	June 4, 1902	
J. L. V.	Asst. surg., Prov. Regt., Porto Rico.	44	do	June 12, 1902	
J. S. W.	Pvt., 108th Coast Arty.	21	do	June 4, 1902	
E. T.	Pvt., Hospl. Corps	35	do	June 17, 1902	
J. M.	Pvt., 78th Coast Arty.		do	July 17, 1901	First Lieut. W. P. Chamberlain, assistant surgeon, U. S. Army.
G. A.	Civilian	7	do	Apr. 17, 1901	
M. D.	do	9	do	Nov. 16, 1901	
S. J.	Pvt., 72d Coast Arty.	19	do	Jan. 27, 1902	
L. E. C.	Pvt., A, 27th Inft.	24	Right inguinal	Oct. 21, 1901	Maj. W. D. Crosby, surgeon, U. S. Army.
C. H.	Mus., 126th Coast Arty.	23	Left inguinal	Feb. 10, 1902	Maj. R. G. Ebert, surgeon, U. S. Army.
P. J. R.	Pvt., C, 8th Inft.	30	Double inguinal	Apr. 13, 1902	
J. W. M.	Pvt., A, 2d Inft.		Right inguinal	Apr. 4, 1902	Maj. Guy L. Edie, surgeon, U. S. Army.
W. E. A.	Tpt., B, 8th Cav.		do	Mar. 18, 1902	First Lieut. C. W. Farr, assistant surgeon, U. S. Army.
J. B. H.	Pvt., G, 15th Inft.	27	Left inguinal	Jan. 31, 1902	Capt. P. C. Fauntleroy, assistant surgeon, U. S. Army.
P. F.	Pvt., I, 28th Inft.	22	do	Oct. 14, 1901	First Lieut. H. L. Gilchrist, assistant surgeon, U. S. Army.
C. H.	Pvt., B, 7th Inft.	26	Right inguinal	Oct. 29, 1901	
R. S. R.	Pvt., Band, 7th Inft.	30	Left inguinal	Jan. 2, 1902	

Name.	Organization.	Age.	Hernia.	Date of operation.	Operator.
J. M	Pvt., 33d Coast Arty		Right inguinal	June 1, 1901	
S. P	Discharged soldier		Double inguinal	July 3, 1901	
W. O. W	Pvt., 92d Coast Arty		Left inguinal	Oct. 28, 1901	
R. M. T	Private, unassigned		Right inguinal	Dec. —, 1901	
A. L	Pvt., 61st Coast Arty		Left inguinal	Nov. —, 1901	
A. K	Mus., Band, 27th Inft		Right inguinal	Dec. —, 1901	
J. B	do		do	do	
J. A. B	Discharged soldier		Double inguinal	do	Lieut. Col. A. C. Girard, deputy surgeon-general, U. S. Army.
A. B.[a]	Pvt., H, 16th Inft		Left inguinal	do	
P. H. P	Pvt., ordnance		do	Feb. —, 1902	
R. A. G	Sgt., G, 10th Inft		Right inguinal	Jan. —, 1902	
C. H	Pvt., 93d Coast Arty		Left inguinal	do	
J. W. S	Cpl., L, 15th Cav		Double inguinal	Feb. —, 1902	
E. T. W	Sgt., C, 1st Cav		Right inguinal	do	
F. M	Recruit, unassigned		do	do	
W. H. D	do		do	Dec. —, 1901	
E. LeR. M	do		do	Feb. —, 1902	
H. W. B	Private, unassigned		Left inguinal	do	
D. E. T	Discharged soldier		Right inguinal	Dec. —, 1901	
J. K. G	Civilian	45	Right femoral	May 4, 1901	John M. Hewitt, contract surgeon, U. S. Army.
J. O	do	35	Right inguinal	Nov. 16, 1901	
H. K	Private, F, 7th Cav	26	Left inguinal	Jan. 18, 1902	Capt. D. C. Howard, assistant surgeon, U. S. Army.
H. J. McK	Second lieut., 7th Cav	25	Right inguinal	Mar. 26, 1902	
L. K	Private, E, 7th Cav	21	do	Apr. 1, 1902	
E. F. G	Private, L, 7th Cav	25	do	Apr. 11, 1902	
J. O'D	Private, I, 12th Cav	21	do	Aug. 10, 1901	
H. Von E	Sergeant, I, 4th Inf	42	Left inguinal	Apr. 4, 1902	Maj. C. F. Mason, surgeon, U. S. Army.
F. S. M	Private, Hospital Corps	25	Right inguinal	Apr. 9, 1902	
F. M. T	Private, I, 4th Inf	25	do	May 30, 1902	
S. L. J	Second lieut., 12th Cav	28	do	May 17, 1902	
E. H. P	Private, 118th Coast Art	29	Left inguinal	Feb. 4, 1902	First Lieut. Henry C. Page, assistant surgeon, U. S. Army.
—. —. —	Civilian		Right inguinal	Apr. —, 1902	Capt. A. N. Stark, assistant surgeon, U. S. Army.
—. —. —	do		Left inguinal	do	
—. —. —			Double inguinal	May —, 1902	
F. C. P	Private, F, 2d Cav		Right inguinal	Sept. 17, 1901	Capt. J. H. Stone, assistant surgeon, U. S. Army.
J. B	Teamster	43	do	Sept. 30, 1900	Maj. B. L. Ten Eyck, surgeon, U. S. Army.
O. J. W	do	30	do	June 1, 1900	
C. B	do	40	do	Jan. 9, 1901	
F. R	Native police		do	June 1, 1901	Maj. Charles Willcox, surgeon, U. S. Army.
D. McT	Private, H, 17th inf		Left inguinal	Aug. 1, 1901	
J. F. S	Sergeant, C, 5th Art	34	Right inguinal	Nov. 30, 1901	First. Lieut. E. P. Wolfe, assistant surgeon, U. S. Army.
J. F. S	do	34	Left inguinal	Apr. 13, 1901	
C. B	Commissary sergeant, 6th Cav.	53	Right inguinal	June 13, 1900	Maj. C. P. Woodruff, surgeon, U. S. Army.

[a] Recurrence of hernia.

Of the injuries constituting 191.77 admissions per thousand of strength of the Army, 143.69, or three-fourths of the total, were represented by cases of abrasions, contusions, sprains, lacerated and incised wounds, as follows:

	Army.	United States.	Philippines and China.	Cuba.	Porto Rico.
Abrasions, blisters, burns, and scalds	21.07	21.56	21.25	26.62	13.88
Contusions and sprains	85.99	68.76	56.93	201.06	71.12
Wounds, contused, lacerated, and punctured	23.44	19.81	17.81	40.59	27.75
Wounds, incised	13.19	12.97	12.23	21.71	11.27
Total	143.69	123.10	108.22	289.98	124.02

None of these cases presented any notable mortality except the incised wounds, which in the Philippines gave 82 deaths, equivalent to 1.24 per thousand of strength. In the United States 3 deaths, equivalent to 0.11 per thousand of strength, resulted from incised wounds.

Most of these wounds in the Philippines were received in action. Sixty-eight men were killed, a larger number than died by gunshot. Sixty-one fell by the bolo, 4 by the dagger, and 1 each by the bowie knife, bamboo spear, and club, while 110 were wounded by similar weapons. Eight of these 110 cases were fatal: Two bolo fractures of the cranium; 1 dagger fracture of the spine, said to have been fatal from septic cerebro-spinal meningitis; 3 wounds in which the thorax was penetrated; 1 bolo fracture of the forearm, with death from hemorrhage, and 1 flesh wound of the thigh, with death from septicæmia and secondary hemorrhage. A summary of these cases is given in the tabulations which follow:

Killed in action by wounds other than gunshot.

REGULARS AND VOLUNTEERS, 1901.

Character and location of wound.	Regulars.						Volunteers.	Total, Regulars and Volunteers.
	Bolo.	Dagger.	Bowie knife.	Bamboo spear.	Club.	Total.	Bolo.	
Head, fracture	13				1	14		14
Neck	3	1				4		4
Thorax, penetrating	20	3	1	1		25	1	26
Abdomen, penetrating	11					11		11
Shoulder, flesh							[a]1	1
Unknown	12					12		12
Total	59	4	1	1	1	66	2	68

[a] Probably severed axillary artery.

NOTE.—The two bolo-wound cases remaining in hospital at date of last annual report were disposed of as follows: The case of fracture of head upon which the operation of trephining had been performed in 1900, and again in August, 1901, was discharged for disability January 27, 1902, for epileptiform convulsions and partial paralysis of right arm. The case of fracture of fingers was returned to duty.

Wounds other than gunshot received in action (exclusive of deaths not on sick report).

REGULARS AND VOLUNTEERS, 1901.

Character and location of wound.	Regulars.															Volunteers.				Total, Regulars and Volunteers.
	Weapon.										Disposition.					Weapon.			Disposition.	
	Bolo.	Dagger.	Stiletto.	Poisoned stiletto.	Bayonet.	Spear.	Bamboo spear.	Club.	Stone.	Total.	Duty.	Certificates of disability.	Died.	Expiration of service.	Remaining last report.	Bolo.	Bamboo spear.	Total.	Duty.	
Head:																				
Flesh	3							1		4	3	1								4
Fracture	2									2			2							2
Face:																				
Flesh	2							1		3	3									3
Fracture	2									2	2									2
Neck	3				1					4	4									4
Spine, fracture		1								1			[a]1							1
Thorax:																				
Nonpenetrating	2	1			1		5			9	9									9
Penetrating	3	2					1			6	3		3							6
Abdomen:																				
Nonpenetrating	1						1			2	2									2
Penetrating	1	[b]1								2	2									2
Back and hip, flesh	3						3			6	5				[c]1		1	1	1	7
Shoulder, flesh	1						3	1		5	5					1		1	1	6
Arm, flesh	3	2	1	1			1			8	7	1								8
Forearm:																				
Flesh	2	1					3			6	5				[d]1		3	3	3	9
Fracture	2									2			[e]1		[f]1					2
Wrist joint	1									1	[g]1									1
Hand, flesh	3						1			4	3			1		1		1	1	5
Fingers, fracture	1									1	1									1
Thigh, flesh	3						9			12	11		[h]1				1	1	1	13
Leg, flesh						1	12	1	1	15	15						2	2	2	17
Foot, flesh							5			5	5									5
Tarsus and metatarsus, fracture							1			1	1									1
Total	38	8	1	1	2	1	45	4	1	101	87	2	8	1	3	2	7	9	9	110

[a] Septic cerebro-spinal meningitis.
[b] Laparotomy performed.
[c] Wounded Dec. 24, 1901; incision left buttock, cicatrized tissue removed, and sciatic nerve released Jan. 27, 1902; remaining in hospital June 30, 1902.
[d] Remaining in hospital Apr. 30, 1902.
[e] Amputation at elbow joint; death from hemorrhage from wound.
[f] Ulna wired, arteries tied Nov. 23, 1901; ulnar nerve and tendon freed and united Mar. 27, 1902; tenotomy June 19, 1902, remaining in hospital June 30, 1902.
[g] Tendons of extensor muscles and capsule of joint stitched with catgut.
[h] Septicemia and secondary hemorrhage.

GUNSHOT INJURIES.

At the close of the last annual report there remained under treatment 25 cases of gunshot wounds, 15 of which were received in action and 10 not in action. Of the 15, 2 were returned to duty, 11 were discharged for disability and 2 on account of the expiration of their term of service. Of the 10 cases which were not battle wounds 3 were returned to duty, 2 left the service by expiration of term, and 5 were discharged for disability, as shown in the following tabulation:

Gunshot wound cases (all in the regular troops) remaining in hospital at date of last annual report, showing dispositions since.

Character and location of wound.	How received.											
	In action.				Not in action.				Total.			
	Remaining at last report.	Disposition.			Remaining at last report.	Disposition.			Remaining at last report.	Disposition.		
		Duty.	Certificates of disability.	Expiration of service.		Duty.	Certificates of disability.	Expiration of service.		Duty.	Certificates of disability.	Expiration of service.
Head, fracture	1	....	1	.....	.....	.....	.....	.....	1	....	1	.....
Face, fracture	1	....	1	.....	.....	.....	.....	.....	1	....	1	.....
Thorax, penetrating	.....	.....	.....	.....	1	....	1	.....	1	....	1	.....
Back and hip, flesh	2	1	.....	1	.....	.....	.....	.....	2	1	.....	1
Arm:												
Flesh	1	1	.....	.....	.....	.....	.....	.....	1	1	.....	.....
Fracture	1	....	1	.....	.....	.....	.....	.....	1	....	1	.....
Elbow joint	.....	.....	.....	.....	1	....	1	.....	1	....	1	.....
Hand, flesh	.....	.....	.....	.....	1	1	.....	.....	1	1	.....	.....
Carpus and metacarpus, fracture	1	....	1	.....	1	1	.....	.....	2	1	1	.....
Fingers, fracture	1	....	1	.....	.....	.....	.....	.....	1	....	1	.....
Thigh:												
Fracture, upper third	2	....	1	1	.....	.....	.....	.....	2	....	1	1
Fracture, middle third	1	....	1	.....	.....	.....	.....	.....	1	....	1	.....
Fracture, lower third	.....	.....	.....	.....	1	....	1	.....	1	....	1	.....
Knee joint	1	....	1	.....	.....	.....	.....	.....	1	....	1	.....
Leg:												
Flesh	.....	.....	.....	.....	1	....	.....	1	1	.....	.....	1
Fracture	3	....	3	.....	2	....	1	1	5	....	4	1
Ankle joint	.....	.....	.....	.....	1	....	1	.....	1	....	1	.....
Foot, flesh	.....	.....	.....	.....	1	1	.....	.....	1	1	.....	.....
Total	15	2	11	2	10	3	5	2	25	5	16	4

During the year 1901, 104 men were killed by gunshot, only 46 of whom met their death in action. Fourteen of the deaths were accidental, 33 suicidal, and 11 homicidal. Thirty of the suicides and all the homicides occurred among the 81,885 regular troops; 3 of the suicides among the 10,606 volunteers. The following tables give a summary of these cases:

Killed by gunshot.

REGULARS, 1901.

Character and location of wound.	How received.					Nature of missile.								
		Not in action.				In action.				Not in action.				
	In action.	Accidental.	Suicide.	Homicide.	Total.	Mauser.	Remington.	Krag-Jorgensen.	Bullets, not stated.	Krag-Jorgensen.	Revolver.	Bullets, not stated.	Small shot.	Explosion of shell.	Powder.
Head, fracture	7	5	19	1	32	1	2	1	3	11	7	6	....	1	.....
Neck	4	....	1	....	5	....	2	....	2	1	.....	.....	.....	.....	.....
Spine, fracture	[a]1	.....	.....	[a]1	2	1	.....	.....	.....	.....	1	.....	.....	.....	.....
Thorax, penetrating	11	3	8	5	27	4	....	1	6	9	6	.....	.....	.....	1
Abdomen, penetrating	5	3	....	1	9	.....	.....	.....	5	1	2	.....	1	.....	....
Shoulder, flesh	[b]1	[c]1	.....	.....	2	....	1	.....	.....	1	.....	.....	.....	.....	.....
Unknown	7	.....	2	3	12	.....	.....	.....	7	1	.....	4	.....	.....	.....
Total	36	12	30	11	89	6	5	2	23	24	16	10	1	1	1

[a] Through medulla oblongata. [b] Severed subclavian artery. [c] Shock and hemorrhage.

Killed by gunshot—Continued.

VOLUNTEERS, 1901.

Character and location of wound.	How received.				Nature of missile.						
		Not in action.			In action.					Not in action.	
	In action.	Accidental.	Suicide.	Total.	Mauser.	Remington.	Krag-Jörgensen.	Bullets, not stated.	Slugs from cannon.	Krag-Jörgensen.	Revolver.
Head, fracture	3	.....	3	6	1	.....	.....	2	.....	2	1
Face, fracture	1	.....	.....	[a] 1	.....	.....	.....	.....	1	.....	.....
Thorax, penetrating	6	1	.....	7	2	1	1	1	1	1	.....
Abdomen, penetrating	....	1	.....	1	.....	.....	.....	.....	.....	1	.....
Total	10	2	3	15	3	1	1	3	2	4	1

[a] Destroying left superior maxilla and left orbit.

REGULAR AND VOLUNTEER ARMIES, 1901.

Character and location of wound.	How received.					Nature of missile.									
		Not in action.				In action.					Not in action.				
	In action.	Accidental.	Suicide.	Homicide.	Total.	Mauser.	Remington.	Krag-Jörgensen.	Bullets, not stated.	Slugs from cannon.	Krag-Jörgensen.	Revolver.	Bullets, not stated.	Small shot.	Explosion of shell.	Powder.
Head, fracture	10	5	22	1	38	2	2	1	5	....	13	8	6	...	1	...
Face, fracture	1	.....	.....	.....	[a] 1	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....
Neck	4	....	1	....	5	...	2	...	2	....	1	.....	.....	.....	.....	.....
Spine, fracture	1	.....	.....	1	[b] 2	1	.....	.....	.....	.....	.....	1	.....	.....	.....	.....
Thorax, penetrating	17	4	8	5	34	6	1	2	7	1	10	6	....	.....	.....	1
Abdomen, penetrating	5	4	....	1	10	.....	.....	...	5	....	2	2	.....	1	.....	...
Shoulder, flesh	1	1	....	....	[c] 2	...	1	.....	.....	.....	1	.....	.....	.....	.....	.....
Unknown	7	....	2	3	12	...	...	...	7	....	1	....	4	...	.....	...
Total	46	14	33	11	104	9	6	3	26	2	28	17	10	1	1	1

[a] Destroying left superior maxilla and left orbit.
[b] Through medulla oblongata.
[c] In one case the subclavian artery was severed; in the other, shock and hemorrhage caused death.

Besides the 104 men killed outright by gunshot there were 475 cases of gunshot injury brought to the hospitals for treatment. This number of cases is equivalent to 5.14 per thousand of strength, and of these 0.53 per thousand were discharged for disability and 0.48 died, leaving 3.82 recoveries per thousand of the strength.

Of the 475 cases of gunshot injury that were brought to the hospitals during the year only 146 were received in action, but 273 of the remainder were reported as having been incurred in the line of duty, 44 not in the line of duty, 6 suicidal, and 6 homicidal. The gunshot casualties of battle amounted therefore to 46 killed and 146 wounded, a total of 192, the killed constituting 24 per cent of those struck; but

as 15 of those received into hospital died from the effects of their injuries, the deaths among those struck constituted a little over 31 per cent.

Of the total number, 475, of wounded men received into hospital, 44 died from the effects of their wounds and 1 from chloroform administered for amputation of the leg, 49 were discharged on certificates of disability, 353 were returned to duty, while 9 remained under treatment at latest reports. Two of the wounded men were reported as missing in action and 19 as discharged by order of expiration of term.

Ten cases of fracture of the cranium were reported, 1 of which was returned to duty, 3 were discharged, and 6 terminated fatally. In one of the cases which recovered a portion of the roof of the right orbit was removed. In one of the fatal cases fragments of bone and a portion of a bullet were removed from the brain, and in each of two other cases, also fatal, fragments of bone and lacerated brain tissue were removed.

Five cases of fracture of the facial bones were taken into hospital, 2 of which were fatal. In one of these an extensive operation was performed, but the patient died of septicemia.

Twenty-two cases of penetration of the thorax were reported, 7 of which were fatal, 12 ended in return to duty, and 3 in discharge for disability. Much bloody liquid was removed from the pleural cavity and 2½ inches from each of the third, fourth, fifth, and sixth ribs were removed in one case. An intercostal artery was ligated and the pleural cavity aspirated in another. A bullet was removed in a third case, and hot sterile normal saline solution was used in a fourth case, all of which ended favorably.

Seventeen cases of penetrating wound of the abdomen were reported, 13 of these were fatal, 1 was terminated by discharge for disability, 1 by muster out, and 2 by return to duty. Laparotomy was performed in 2 cases and nephrectomy and suture of the colon in 1 case, all fatal.

Six cases of fracture of the arm were reported, 1 fatal. In this case both arms were shattered by the premature explosion of a shell. A double amputation was performed.

Ten cases of fracture of the forearm appear on the reports. One of the patients died, 5 were discharged for disability, 1 by order, and 3 were returned to duty. Death in the fatal case was from septicemia after amputation.

Of 2 cases of fracture of the wrist joint, 1 died, but the death was attributed less to the wound than to exhaustion from profound nervous depression and mental worry.

Among 59 flesh wounds of the thigh there were 3 deaths, caused in 1 by tetanus and in 2 by hemorrhage.

One of the 6 fractures of the upper third of the femur proved fatal from shock. In one of the recoveries a secondary amputation through the neck of the femur was performed.

Of 5 fractures of the middle third of the femur, 2 proved fatal, 1 from shock after amputation, the other from septicemia; 1 was discharged for disability, 1 was returned to duty, and 1 remains under treatment at latest reports.

Of 2 fractures of the lower third of the femur, 1 was discharged for disability and 1 remains under treatment. A secondary amputation was performed in each of these cases.

Eight cases of fracture of the kneejoint were reported, 4 of which proved fatal, 2 ended in return to duty, and 2 in discharge. In 1 of the cases of recovery a secondary excision was performed. Death in 1 case was from tetanus and in 3 cases from septicæmia and shock after resection in 1 case and after secondary amputation in 2 cases.

Of 16 cases of fracture of the leg, 7 were returned to duty, 6 were discharged for disability, 2 by order, while 1 continues under treatment. Amputation was performed in 4 of these cases. In a flesh wound of the leg in which amputation was considered necessary, death occurred from chloroform narcosis. Amputation was performed also in a case of fracture of the tarsus and metatarsus.

A summary of the data concerning these wounds is given in the following tables:

A. Gunshot wounds received in action.
   1. Regular Army.
   2. Volunteer Army.
   3. Regulars and Volunteers.
B. Gunshot wounds other than battle wounds.
   1. Regular Army.
   2. Volunteer Army.
   3. Regulars and Volunteers.
C. All gunshot wounds.
   1. Regular Army.
   2. Volunteer Army.
   3. Regulars and Volunteers.
D. Gunshot wounds which terminated fatally.
   1. Regular Army.
   2. Volunteer Army.
   2. Regulars and Volunteers.
E. Surgical operations for gunshot wounds.

A 1.—*Gunshot wounds received in action (exclusive of deaths not on sick report).*

REGULAR ARMY. 1891.

Character and location of wound.	Nature of missile.										Disposition.					
	Mauser.	Remington.	Krag-Jorgensen.	Bullets, not stated.	Revolver.	Small shot.	Fragment of jacket or bullet.	Explosion of cartridge.	Slugs.	Shrapnel.	Total.	Duty.	Certificates of disability.	Died.	Expiration of service.	Remaining, last report.	Total.
Head:																	
Flesh				1							1	1					1
Fracture	1										1			1			1
Face:																	
Flesh				1		1					2	2					2
Fracture		1									1			1			1
Neck			1						1		2	2					2
Thorax:																	
Non-penetrating	5								1		6	6					6
Penetrating	3	2		1							6	3		3			6
Abdomen:																	
Non-penetrating			1	2							3	3					3
Penetrating	3										3	1		1	1		3
Pelvis		1									1	1					1
Back and hip	1			4					1		6	6					6
Perineum, genital and urinary organs	1										1	1					1
Shoulder:																	
Flesh	2		1						1	1	5	5					5
Fracture, clavicle or scapula	1										1	1					1
Arm:																	
Flesh	2	2	1	2			1				8	8					8
Fracture		1									1		1				1
Elbow joint		1		1			1				3	2	1				3

A 1.—*Gunshot wounds received in action (exclusive of deaths not on sick report)*—Cont'd.

REGULAR ARMY, 1901.

Character and location of wound.	Nature of missile.										Disposition.					
	Mauser.	Remington.	Krag-Jørgensen.	Bullets, not stated.	Revolver.	Small shot.	Fragments of projectile not stated.	Explosives and cartridges.	Shell.	Shrapnel.	Total.	Duty.	Certificates of disability.	Died.	Expiration of service.	Remaining sick in post hospital.	Total.
Forearm:																	
Flesh	3	....	1	1	....	....	....	....	1	....	6	6	....	....	....	....	6
Fracture	1	1	....	....	....	....	....	....	....	....	2	1	....	1	....	....	2
Hand, flesh	....	1	....	2	2	....	....	....	....	....	5	4	1	....	....	....	5
Thigh:																	
Flesh	6	3	5	2	....	....	....	....	....	1	17	16	1	....	....	....	17
Fracture, upper third	1	1	1	1	....	....	....	....	....	....	4	....	2	1	1	....	4
Fracture, middle third	....	3	....	....	....	....	....	....	....	....	3	....	....	2	....	1	3
Fracture, lower third	1	....	1	....	....	....	....	....	....	....	2	....	1	....	....	1	2
Knee joint	1	....	1	....	....	....	....	....	....	....	2	1	....	1	....	....	2
Leg:																	
Flesh	2	3	....	1	....	....	....	....	2	....	8	8	....	....	....	....	8
Fracture	2	2	....	1	....	....	....	....	....	....	5	2	2	....	1	....	5
Ankle joint	1	....	....	....	....	....	....	....	....	....	1	....	1	....	....	....	1
Foot, flesh	....	....	....	....	....	....	....	....	....	1	1	1	....	....	....	....	1
Tarsus and metatarsus, fracture	....	1	....	....	....	....	....	....	....	....	1	....	1	....	....	....	1
Toes, fracture	....	....	....	1	....	....	....	....	....	....	1	1	....	....	....	....	1
Wounds not described	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Total	37	23	10	21	2	1	1	1	7	3	109	86	10	11	3	2	109

[a] Remaining in hospital Apr. 30, 1902.

A 2.—*Gunshot wounds received in action (exclusive of deaths not on sick report).*

VOLUNTEER ARMY, 1901.

Character and location of wound.	Nature of missile.					Disposition.						
	Mauser.	Remington.	Krag-Jørgensen.	Bullets, not stated.	Total.	Duty.	Certificates of disability.	Died.	Discharged by order.	Mustered out.	Missing in action.	Total.
Head:												
Flesh	....	1	....	1	2	2	....	....	....	....	....	2
Fracture	1	....	....	....	1	....	1	....	....	....	....	1
Face:												
Flesh	1	....	....	....	1	1	....	....	....	....	....	1
Fracture	....	....	....	1	1	1	....	....	....	....	....	1
Abdomen, penetrating	1	1	1	1	4	....	1	3	....	....	....	4
Back and hip, flesh	....	....	....	1	1	1	....	....	....	....	....	1
Shoulder, flesh	1	....	....	1	2	2	....	....	....	....	....	2
Arm:												
Flesh	....	....	1	1	2	2	....	....	....	....	....	2
Fracture	1	....	....	....	1	1	....	....	....	....	....	1
Elbow joint	1	....	....	....	1	....	....	....	....	1	....	1
Forearm:												
Flesh	1	....	....	2	3	2	....	....	1	....	....	3
Fracture	1	....	....	....	1	1	....	....	....	....	....	1
Wrist joint	....	....	....	....	....	....	....	....	....	....	....	....
Hand, flesh	....	....	....	1	1	....	....	....	....	1	....	1
Thigh:												
Flesh	2	2	....	4	8	5	....	1	....	2	....	8
Fracture, upper third	....	....	....	....	....	....	....	....	....	....	....	....
Fracture, middle third	....	1	....	....	1	....	1	....	....	....	....	1
Fracture, lower third	....	....	....	....	....	....	....	....	....	....	....	....
Knee joint	....	1	....	....	1	....	....	....	1	....	....	1
Leg:												
Flesh	....	....	....	2	2	2	....	....	....	....	....	2
Fracture	....	....	....	1	1	....	1	....	....	....	....	1
Wounds not described	....	....	....	3	3	....	....	....	....	1	2	3
Total	10	6	2	19	37	20	4	4	2	5	2	37

A 3.—*Gunshot wounds received in action (exclusive of deaths not on sick report.)*

REGULAR AND VOLUNTEER ARMIES, 1901.

Character and location of wound.	Nature of missile.						
	Mauser.	Remington.	Krag-Jörgensen.	Bullets, not stated.	Revolver.	Small shot.	Fragment of jacket of bullet.
Head:							
Flesh		1		2			
Fracture	2						
Face:							
Flesh	1			1		1	
Fracture		1		1			
Neck			1				
Thorax:							
Nonpenetrating	5						
Penetrating	3	2		1			
Abdomen:							
Nonpenetrating			1	2			
Penetrating	4	1	1	1			
Pelvis, fracture		1					
Back and hip, flesh	1			5			
Perineum, genital and urinary organs	1						
Shoulder:							
Flesh	3		1	1			
Fracture, clavicle or scapula	1						
Arm:							
Flesh	2	2	2	3			
Fracture	1	1					
Elbow joint	1	1		1			1
Forearm:							
Flesh	4		1	3			
Fracture	2	1					
Hand, flesh		1		3	2		
Thigh:							
Flesh	8	5	5	6			
Fracture, upper third	1	1	1	1			
Fracture, middle third		4					
Fracture, lower third	1		1				
Knee joint	1	1	1				
Leg:							
Flesh	2	3		3			
Fracture	2	2		2			
Ankle joint	1						
Foot, flesh							
Tarsus and metatarsus, fracture		1					
Toes, fracture				1			
Wounds not described				3			
Total	47	29	15	40	2	1	1

A 3.—*Gunshot wounds received in action (exclusive of deaths not on sick report).*

REGULAR AND VOLUNTEER ARMIES, 1901.

Nature of missile.			Disposition.							
Explosion of cartridge.	Slugs.	Shrapnel.	Total.	Duty.	Certificates of disability.	Died.	Discharged by order.	Expiration of service and muster out.	Missing in action.	Remaining, last report.	Total.
			3	3							3
			2		1	1					2
			3	3							3
			2	1		1					2
	1		2	2							2
	1		6	6							6
			6	3		3					6
			3	3							3
			7	1	1	4		1			7
			1	1							1
	1		7	7							7
			1	1							1
	1	1	7	7							7
			1	1							1
1			10	10							10
			2	1	1						2
			4	2	1			1			4
	1		9	8			1				9
			3	2		1					3
			6	5				1			6
		1	25	21	1	1		2			25
			4		2	1		1			4
			4		1	2				1	4
			2		1					1	2
			3	1		1	1				3
	2		10	10							10
			6	2	3			1			6
			1		1						1
		1	1	1							1
			1		1						1
			1	1							1
			3					1	2		3
1	7	3	146	103	14	15	2	8	2	2	146

B 1.—*Gunshot wounds other than battle wounds (exclusive of deaths not on sick report).*

REGULAR ARMY, 1901.

Character and location of wound.	How received.					Nature of missile.							
	In line of duty.	Not in line of duty.	Suicidal.	Homicidal.	Total.	Mauser.	Krag-Jorgensen.	Bullets, not stated.	Revolvers.	Small shot.	Blank cartridge.	Fragment of bullet.	Fragment of jacket of bullet.
Head:													
Flesh	2	1	....	....	3	....	....	1	1	....	....	....	....
Fracture	5	1	1	....	7	....	2	....	4	....	....	....	....
Face:													
Flesh	12	2	1	....	15	....	....	2	1	2	....	2	....
Fracture	1	1	....	....	2	....	....	....	2	....	....	....	....
Neck	1	....	....	....	1	....	....	....	1	....	....	....	....
Spine, fracture	2	....	....	....	2	....	1	....	1	....	....	....	....
Thorax:													
Nonpenetrating	4	3	2	1	10	....	3	2	4	....	....	....	....
Penetrating	12	2	1	1	16	....	1	1	12	....	....	....	....
Abdomen:													
Nonpenetrating	3	1	....	....	4	....	....	1	3	....	....	....	....
Penetrating	6	1	1	2	10	....	4	1	4	....	....	....	....
Pelvis, fracture	....	1	....	....	1	....	1	....	....	....	....	....	....
Back and hip, flesh	4	2	....	....	6	1	1	....	2	1	....	....	....
Perineum, genital, and urinary organs	2	....	....	....	2	....	1	....	1	....	....	....	....
Shoulder:													
Flesh	4	....	....	1	5	....	2	....	2	....	....	....	....
Joint	....	1	....	....	1	....	....	1	....	....	....	....	....
Arm:													
Flesh	8	....	....	....	8	....	1	1	1	....	....	....	....
Fracture	4	....	....	....	4	....	1	....	1	....	....	....	....
Elbow joint	4	....	....	....	4	....	3	....	1	....	....	....	....
Forearm:													
Flesh	12	3	....	....	15	....	....	4	6	1	....	....	2
Fracture	7	....	....	....	7	....	2	....	1	....	....	....	....
Wrist joint	2	....	....	....	2	....	1	....	1	....	....	....	....
Hand, flesh	29	5	....	....	34	....	7	7	12	2	1	....	....
Carpus and metacarpus, fracture	9	3	....	....	12	....	8	2	2	....	....	....	....
Fingers, fracture	32	5	....	....	37	....	15	9	9	4	....	....	....
Thigh:													
Flesh	27	4	....	1	32	....	6	6	15	1	2	....	....
Fracture, upper third	2	....	....	....	2	....	2	....	....	....	....	....	....
Fracture, middle third	1	....	....	....	1	....	....	1	....	....	....	....	....
Knee joint	4	1	....	....	5	....	4	....	1	....	....	....	....
Leg:													
Flesh	25	4	....	....	29	....	5	4	18	1	....	....	....
Fracture	7	1	....	....	8	....	3	....	4	....	....	....	....
Foot, flesh	13	1	....	....	14	....	3	1	10	....	....	....	....
Tarsus and metatarsus fracture	7	1	....	....	8	....	6	1	1	....	....	....	....
Toes, fracture	2	....	....	....	2	....	1	....	....	1	....	....	....
Total	253	44	6	6	309	1	84	45	121	13	3	2	2

B 1.—*Gunshot wounds other than battle wounds (exclusive of deaths not on sick report).*

REGULAR ARMY, 1901.

Nature of missile.							Disposition.								
Explosion of cartridge.	Explosion of shell.	Explosion of hand grenade.	Explosion of primer.	Powder.	Breechblock.	Total.	Duty.	Certificates of disability.	Died.	Deserted by date.	Expiration of term, &c.	Discharged.	Death, other causes.	Remaining Sept. 30, 1901.	Total.
1						3									3
1						7	1	2	1						4
1	3	1		3		15	14	1						14	15
						2	1	1							1
						1	1								1
						2			2						2
	1					10	10								10
				2		16	9	3	4						16
						1	1								1
	1					10	1		[b]9						10
		1				1	1								1
						6	[c]								[c]
						2	1		1						2
	1					5	5								5
						1				1					1
2	1			1	1	8	7	1							8
	1			1		4	2	1	1						4
						[a]4	1	2						[a]1	4
1	1					15	15								15
	1			3		7	1	5						[c]1	7
						2	1		1						2
1			2	2		34	33	1							34
						12	10	1						[c]1	12
						37	27	9				1			37
	1	1				32	29		2					[a]1	32
						2	1							[a]1	2
						1	1								1
						5	1	1	[d]3						5
	1					29	27				1		[a]1		29
		1				8	5	2						[c]1	8
						14	11								14
						8	5	3							8
						2	2								2
7	12	4	2	12	1	309	238	33	[e]27	1	1	1	1	7	309

[a] Remaining in hospital June 30, 1902.
[b] One of these died in 1902.
[c] Remaining in hospital April 30, 1902.
[d] Septicemia appeared. Died from chloroform during amputation of leg.
[e] Two of these died in 1902.

B 2.—*Gunshot wounds other than battle wounds (exclusive of deaths not on sick report).*

VOLUNTEER ARMY, 1901.

Character and location of wound.	How received.	Nature of missile.						Disposition.				
	In line of duty.	Krag-Jorgensen.	Bullets, not stated.	Revolver.	Explosion of cartridge.	Fragment of bursted rifle.	Total.	Duty.	Certificates of disability.	Died.	Muster out.	Total.
Head, fracture	1	....	1	....	....	....	1	....	....	1	....	1
Face:												
Flesh	1	....	....	....	....	1	1	1	....	....	....	1
Fracture	1	1	....	....	....	....	1	....	....	1	....	1
Arm, flesh	1	1	....	....	....	....	1	1	....	....	....	1
Forearm, flesh	2	1	....	1	....	....	2	2	....	....	....	2
Hand, flesh	1	1	....	....	....	....	1	1	....	....	....	1
Carpus and metacarpus, fracture	1	1	....	....	....	....	1	1	....	....	....	1
Fingers, fracture	3	2	....	1	....	....	3	2	....	....	1	3
Thigh, flesh	2	....	1	1	....	....	2	1	....	....	1	2
Leg:												
Flesh	2	1	....	....	1	....	2	2	....	....	....	2
Fracture	2	1	1	....	....	....	2	....	1	....	1	2
Toes, fracture	3	....	3	....	....	....	3	1	1	....	1	3
Total	20	9	6	3	1	1	20	12	2	2	4	20

B 3.—*Gunshot wounds other than battle wounds (exclusive of deaths not on sick report).*

REGULAR AND VOLUNTEER ARMIES, 1901.

Character and location of wound.	How received.					Nature of missile.				
	In line of duty.	Not in line of duty.	Suicidal.	Homicidal.	Total.	Mauser.	Krag-Jorgensen.	Bullets, not stated.	Revolver.	Small shot.
Head:										
Flesh	2	1	.....	.....	3	.....	.....	1	1	.....
Fracture	6	1	1	.....	8	.....	2	1	4	.....
Face:										
Flesh	13	2	1	.....	16	.....	.....	2	1	2
Fracture	2	1	.....	.....	3	.....	1	.....	2	.....
Neck	1	.....	.....	.....	1	.....	.....	.....	1	.....
Spine, fracture	2	.....	.....	.....	2	.....	1	.....	1	.....
Thorax:										
Nonpenetrating	4	3	2	1	10	.....	3	2	4	.....
Penetrating	12	2	1	1	16	.....	1	1	12	.....
Abdomen:										
Nonpenetrating	3	1	.....	.....	4	.....	.....	1	3	.....
Penetrating	6	1	1	2	10	.....	4	1	4	.....
Pelvis, fracture	.....	1	.....	.....	1	.....	1	.....	.....	.....
Back and hip, flesh	4	2	.....	.....	6	1	1	.....	2	1
Perineum, genital and urinary organs	2	.....	.....	.....	2	.....	1	.....	1	.....
Shoulder:										
Flesh	4	.....	.....	1	5	.....	2	.....	2	.....
Joint	.....	1	.....	.....	1	.....	.....	1	.....	.....
Arm:										
Flesh	9	.....	.....	.....	9	.....	2	1	1	.....
Fracture	4	.....	.....	.....	4	.....	1	.....	1	.....
Elbow joint	4	.....	.....	.....	4	.....	3	.....	1	.....
Forearm:										
Flesh	14	3	.....	.....	17	.....	1	4	7	1
Fracture	7	.....	.....	.....	7	.....	2	.....	1	.....
Wrist joint	2	.....	.....	.....	2	.....	1	.....	1	.....
Hand, flesh	30	5	.....	.....	35	.....	8	7	12	2
Carpus and metacarpus fracture	10	3	.....	.....	13	.....	9	2	2	.....
Fingers, fracture	35	5	.....	.....	40	.....	17	9	10	4
Thigh:										
Flesh	29	4	.....	1	34	.....	6	7	16	1
Fracture upper third	2	.....	.....	.....	2	.....	2	.....	.....	.....
Fracture middle third	1	.....	.....	.....	1	.....	.....	1	.....	.....
Kneejoint	4	1	.....	.....	5	.....	4	.....	1	.....
Leg:										
Flesh	27	4	.....	.....	31	.....	6	4	18	1
Fracture	9	1	.....	.....	10	.....	4	1	4	.....
Foot, flesh	13	1	.....	.....	14	.....	3	1	10	.....
Tarsus and metatarsus fracture	7	1	.....	.....	8	.....	6	1	1	.....
Toes, fracture	5	.....	.....	.....	5	.....	1	3	.....	1
Total	273	44	6	6	329	1	93	51	124	13

B 3.—*Gunshot wounds other than battle wounds (exclusive of deaths not on sick report).*

REGULAR AND VOLUNTEER ARMIES, 1901.

Nature of missile.											Disposition.							
Blank cartridge.	Fragment of bullet.	Fragment of jacket of bullet.	Explosion of cartridge.	Explosion of shell.	Explosion of hand mortar.	Explosion of primer.	Powder.	Breechblock.	Fragment of burst ed rifle.	Total.	Duty.	Certificates of disability.	Died.	Discharged by order.	Expiration of serv ice and mustered out.	Deserted.	Death, other causes.	Remaining last re port.	Total.
....	....	.....	1	....	....	....	....	....	.....	3	3	.....	....	....	.....	....	.....	.....	3
....	....	.....	1	....	....	....	....	....	.....	8	1	2	5	....	.....	....	.....	.....	8
....	2	.....	1	3	1	....	3	....	1	16	14	1	....	....	.....	....	.....	1	16
....	....	.....	....	....	....	....	....	....	.....	3	1	1	1	....	.....	....	.....	.....	3
....	....	.....	....	....	....	....	....	....	.....	1	1	.....	....	....	.....	....	.....	.....	1
....	....	.....	....	....	....	....	....	....	.....	2	....	.....	2	....	.....	....	.....	.....	2
....	....	.....	....	1	....	....	....	....	.....	10	10	.....	....	....	.....	....	.....	.....	10
....	....	.....	....	....	....	....	2	....	.....	16	9	3	4	....	.....	....	.....	.....	16
....	....	.....	....	....	....	....	....	....	.....	4	4	.....	....	....	.....	....	.....	.....	4
....	....	.....	....	1	....	....	....	....	.....	10	1	.....	[c]9	....	.....	....	.....	.....	10
....	....	.....	....	....	....	....	....	....	.....	1	1	.....	....	....	.....	1	.....	.....	1
....	....	.....	....	....	1	....	....	....	.....	6	6	.....	....	....	.....	....	.....	.....	6
....	....	.....	....	....	....	....	....	....	.....	2	1	.....	1	....	.....	....	.....	.....	2
....	....	.....	....	1	....	....	....	....	.....	5	5	.....	....	....	.....	....	.....	.....	5
....	....	.....	....	....	....	....	....	....	.....	1	....	.....	....	1	.....	....	.....	.....	1
....	....	.....	2	1	....	....	1	1	.....	9	8	1	....	....	.....	....	.....	.....	9
....	....	.....	....	1	....	....	1	....	.....	4	2	1	1	....	.....	....	.....	.....	4
....	....	.....	....	....	....	....	....	....	.....	1	1	2	....	....	.....	....	.....	1	4
....	....	2	1	1	....	....	....	....	.....	17	17	.....	....	....	.....	....	.....	.....	17
....	....	.....	....	1	....	....	3	....	.....	7	1	5	....	....	.....	....	.....	1	7
....	....	.....	....	....	....	....	....	....	.....	2	1	.....	1	....	.....	....	.....	.....	2
1	....	.....	1	....	....	2	2	....	.....	35	34	1	....	....	.....	....	.....	.....	35
....	....	.....	....	....	....	....	....	....	.....	13	11	1	....	....	.....	....	.....	1	13
....	....	.....	....	....	....	....	....	....	.....	40	29	9	....	....	1	1	.....	.....	40
2	....	.....	....	1	1	....	....	....	.....	34	30	.....	2	....	1	....	.....	1	34
....	....	.....	....	....	....	....	....	....	.....	2	1	.....	....	....	.....	....	.....	1	2
....	....	.....	....	....	....	....	....	....	.....	1	1	.....	....	....	.....	....	.....	.....	1
....	....	.....	....	....	....	....	....	....	.....	5	1	1	[a]3	....	.....	....	.....	.....	5
....	....	.....	1	1	....	....	....	....	.....	31	29	.....	....	....	1	....	[b]1	.....	31
....	....	.....	....	....	1	....	....	....	.....	10	5	3	....	....	1	....	.....	1	10
....	....	.....	....	....	....	....	....	....	.....	14	14	.....	....	....	.....	....	.....	.....	14
....	....	.....	....	....	....	....	....	....	.....	8	5	3	....	....	.....	....	.....	.....	8
....	....	.....	....	....	....	....	....	....	.....	5	3	1	....	....	1	....	.....	.....	5
3	2	2	8	12	4	2	12	1	1	329	250	35	[c]29	1	5	1	1	7	329

[a] One of these died in 1902.
[b] Septicæmia appeared; died from chloroform during amputation of leg.
[c] Two of these died in 1902.

C 1.—*All gunshot wounds (exclusive of deaths not on sick report).*

REGULAR ARMY, 1901.

Character and location of wound.	How received.						Nature of missile.			
		Not in action.								
	In action.	In line of duty.	Not in line of duty.	Suicidal.	Homicidal.	Total.	Mauser.	Remington.	Krag-Jörgensen.	Bullets, not stated.
Head:										
Flesh	1	2	1			4				2
Fracture	1	5	1	1		8	1		2	
Face:										
Flesh	2	12	2	1		17				3
Fracture	1	1	1			3		1		
Neck	2	1				3			1	
Spine, fracture		2				2			1	
Thorax:										
Nonpenetrating	6	4	3	2	1	16	5		3	2
Penetrating	6	12	2	1	1	22	3	2	1	2
Abdomen:										
Nonpenetrating	3	3	1			7			1	3
Penetrating	3	6	1	1	2	13	3		4	1
Pelvis, fracture	1		1			2		1	1	
Back and hip, flesh	6	4	2			12	2		1	4
Perineum, genital and urinary organs	1	2				3	1		1	
Shoulder:										
Flesh	5	4			1	10	2		3	
Fracture, clavicle or scapula	1					1	1			
Joint			1			1				1
Arm:										
Flesh	8	8				16	2	2	2	3
Fracture	1	4				5		1	1	
Elbow joint	3	4				7		1	3	1
Forearm:										
Flesh	6	12	3			21	3		1	5
Fracture	2	7				9	1	1	2	
Wrist joint		2				2			1	
Hand, flesh	5	29	5			39		1	7	9
Carpus and metacarpus, fracture		9	3			12			8	2
Fingers, fracture		32	5			37			15	9
Thigh:										
Flesh	17	27	4		1	49	6	3	11	8
Fracture upper third	4	2				6	1	1	3	1
Fracture middle third	3	1				4		3		1
Fracture lower third	2					2	1		1	
Knee joint	2	4	1			7	1		5	
Leg:										
Flesh	8	25	4			37	2	3	5	5
Fracture	5	7	1			13	2	2	3	1
Ankle joint	1					1	1			
Foot, flesh	1	13	1			15			3	1
Tarsus and metatarsus, fracture	1	7	1			9		1	6	1
Toes, fracture	1	2				3			1	1
Total	109	253	44	6	6	418	38	23	97	66

C 1.—*All gunshot wounds (exclusive of deaths not on sick report).*

REGULAR ARMY, 1901.

Nature of missile.													Disposition.							
Revolver.	Small shot.	Blank cartridge.	Fragment of bullet.	Fragment of jacket of bullet.	Explosion of cartridge.	Explosion of shell.	Explosion of hand mortar.	Explosion of primer.	Slugs.	Shrapnel.	Powder.	Breechblock.	Total.	Duty.	Certificates of disability.	Died.	Discharged by order.	Expiration of service.	Deserted.	Death, other causes.	Remaining last report.	Total.
1	....	....	....	....	1	....	....	....	....	....	....	....	1	1	....	....	....	....	....	....	....	1
4	....	....	....	....	1	....	....	....	....	....	....	....	5	1	2	2	....	....	....	....	....	5
1	3	....	2	....	1	3	1	....	....	....	3	....	17	15	1	....	....	....	....	....	[a]1	17
2	....	....	....	....	....	....	....	....	....	....	....	....	3	1	1	1	....	....	....	....	....	3
1	....	....	....	....	....	....	....	....	1	....	....	....	3	3	....	....	....	....	....	....	....	3
1	....	....	....	....	....	....	....	....	....	....	....	....	2	....	....	2	....	....	....	....	....	2
4	....	....	....	....	....	1	....	....	1	....	....	....	16	16	....	....	....	....	....	....	....	16
12	....	....	....	....	....	....	....	....	....	....	2	....	22	12	3	7	....	....	....	....	....	22
3	....	....	....	....	....	....	....	....	....	....	....	....	7	7	....	....	....	....	....	....	....	7
4	....	....	....	....	....	1	....	....	....	....	....	....	13	2	....	[b]10	....	1	....	....	....	13
....	....	....	....	....	....	....	....	....	....	....	....	....	2	2	....	....	....	....	....	....	....	2
2	1	....	....	....	....	....	1	....	1	....	....	....	12	12	....	....	....	....	....	....	....	12
1	....	....	....	....	....	....	....	....	....	....	....	....	3	2	....	1	....	....	....	....	....	3
2	....	....	....	....	....	1	....	....	1	1	....	....	10	10	....	....	....	....	....	....	....	10
....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	....	....	....	....	....	....	....	1
....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	1	....	....	....	....	....	1
1	....	....	....	....	3	1	....	....	....	....	1	1	16	15	1	....	....	....	....	....	....	16
1	....	....	....	....	....	1	....	....	....	....	1	....	5	2	2	1	....	....	....	....	....	5
1	....	....	....	1	....	....	....	....	....	....	....	....	7	3	3	....	....	....	....	....	[a]1	7
6	1	....	....	2	1	1	....	....	1	....	....	....	21	21	....	....	....	....	....	....	....	21
1	....	....	....	....	....	1	....	....	....	....	3	....	9	2	5	1	....	....	....	....	[c]1	9
1	....	....	....	....	....	....	....	....	....	....	....	....	2	1	....	1	....	....	....	....	....	2
14	2	1	....	....	1	....	....	2	....	....	2	....	39	38	1	....	....	....	....	....	....	39
2	....	....	....	....	....	....	....	....	....	....	....	....	12	10	1	....	....	....	....	....	[c]1	12
9	4	....	....	....	....	....	....	....	....	....	....	....	37	27	9	....	....	....	1	....	....	37
15	1	2	....	....	....	1	1	....	....	1	....	....	49	45	1	2	....	....	....	....	[c]1	49
....	....	....	....	....	....	....	....	....	....	....	....	....	6	1	2	1	....	1	....	....	[a]1	6
....	....	....	....	....	....	....	....	....	....	....	....	....	4	1	....	2	....	....	....	....	[c]1	4
....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	1	....	....	....	....	....	[c]1	2
1	....	....	....	....	....	....	....	....	....	....	....	....	7	2	1	[a]4	....	....	....	....	....	7
18	1	....	....	....	....	1	....	....	2	....	....	....	37	35	....	....	....	1	....	[d]1	....	37
4	....	....	....	....	....	....	1	....	....	....	....	....	13	7	4	....	....	1	....	....	[c]1	13
....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	....	....	....	....	....	....	1
10	....	....	....	....	....	....	....	....	....	1	....	....	15	15	....	....	....	....	....	....	....	15
1	....	....	....	....	....	....	....	....	....	....	....	....	9	5	4	....	....	....	....	....	....	9
....	1	....	....	....	....	....	....	....	....	....	....	....	3	3	....	....	....	....	....	....	....	3
123	14	3	2	3	8	12	4	2	7	3	12	1	418	321	43	[e]38	1	4	1	1	9	418

[a] Remaining in hospital June 30, 1902.
[b] One of these died in 1902.
[c] Remaining in hospital April 30, 1902.
[d] Septicemia appeared; died from chloroform during amputation of leg.
[e] Two of these died in 1902.

C 2.—*All gunshot wounds (exclusive of deaths not on sick report).*

VOLUNTEER ARMY, 1901.

Character and location of wound.	How received.			Nature of missile.		
	In action.	Not in action; in line of duty.	Total.	Mauser.	Remington.	Krag-Jörgensen.
Head:						
Flesh	2		2		1	
Fracture	1	1	2	1		
Face:						
Flesh	1	1	2	1		
Fracture	1	1	2			1
Abdomen, penetrating	4		4	1	1	1
Back and hip, flesh	1		1			
Shoulder, flesh	2		2	1		
Arm:						
Flesh	2	1	3			2
Fracture	1		1	1		
Elbow joint	1		1	1		
Forearm:						
Flesh	3	2	5	1		1
Fracture	1		1	1		
Hand, flesh	1	1	2			1
Carpus and metacarpus, fracture		1	1			1
Fingers, fracture		3	3			2
Thigh:						
Flesh	8	2	10	2	2	
Fracture, middle third	1		1		1	
Kneejoint	1		1		1	
Leg:						
Flesh	2	2	4			1
Fracture	1	2	3			1
Toes, fracture		3	3			
Wounds not described	3		3			
Total	37	20	57	10	6	11

C 2.—*All gunshot wounds (exclusive of deaths not on sick report).*

VOLUNTEER ARMY, 1901.

Nature of missile.					Disposition.						
Bullets, not stated.	Revolver.	Explosion of cartridge.	Fragments of bursted rifle.	Total.	Duty.	Certificates of disability.	Died.	Discharged by order.	Muster out.	Missing in action.	Total.
1				2	2						2
1				2		1	1				2
			1	2	2						2
1				2	1		1				2
1				4		1	3				4
1				1	1						1
1				2	2						2
1				3	3						3
				1	1						1
				1					1		1
2	1			5	4			1			5
				1	1						1
1				2	1				1		2
				1	1						1
	1			3	2				1		3
5	1			10	6		1		3		10
				1		1					1
				1				1			1
2		1		4	4						4
2				3		2			1		3
3				3	1	1			1		3
3				3					1	2	3
25	3	1	1	57	32	6	6	2	9	2	57

C 3.—*All gunshot wounds (exclusive of deaths not on sick report).*

REGULAR AND VOLUNTEER ARMIES, 1901.

Character and location of wound.	How received.						Nature of missile.					
		Not in action.										
	In action.	In line of duty.	Not in line of duty.	Suicidal.	Homicidal.	Total.	Mauser.	Remington.	Krag-Jörgensen.	Bullets not stated.	Revolver.	Small shot.
Head:												
Flesh	3	2	1	....	....	6	....	1	....	3	1	....
Fracture	2	6	1	1	....	10	2	....	2	1	4	....
Face:												
Flesh	3	13	2	1	....	19	1	....	....	3	1	3
Fracture	2	2	1	....	....	5	....	1	1	1	2	....
Neck	2	1	....	....	....	3	....	....	1	....	1	....
Spine, fracture	....	2	....	....	....	2	....	....	1	....	1	....
Thorax:												
Nonpenetrating	6	4	3	2	1	16	5	....	3	2	4	....
Penetrating	6	12	2	1	1	22	3	2	1	2	12	....
Abdomen:												
Nonpenetrating	3	3	1	....	....	7	....	....	1	3	3	....
Penetrating	7	6	1	1	2	17	4	1	5	2	4	....
Pelvis, fracture	1	....	1	....	....	2	....	1	1	....	....	....
Back and hip, flesh	7	4	2	....	....	13	2	....	1	5	2	1
Perineum, genital and urinary organs	1	2	....	....	....	3	1	....	1	....	1	....
Shoulder:												
Flesh	7	4	....	....	1	12	3	....	3	1	2	....
Fracture, clavicle or scapula	1	....	....	....	....	1	1	....	....	....	....	....
Joint	....	....	1	....	....	1	....	....	....	1	....	....
Arm:												
Flesh	10	9	....	....	....	19	2	2	4	4	1	....
Fracture	2	4	....	....	....	6	1	1	1	....	1	....
Elbow joint	4	4	....	....	....	8	1	1	3	1	1	....
Forearm:												
Flesh	9	14	3	....	....	26	4	....	2	7	7	1
Fracture	3	7	....	....	....	10	2	1	2	....	1	....
Wrist joint	....	2	....	....	....	2	....	....	1	....	1	....
Hand, flesh	6	30	5	....	....	41	....	1	8	10	14	2
Carpus and metacarpus, fracture	....	10	3	....	....	13	....	....	9	2	2	....
Fingers, fracture	....	35	5	....	....	40	....	....	17	9	10	4
Thigh:												
Flesh	25	29	4	....	1	59	8	5	11	13	16	1
Fracture, upper third	4	2	....	....	....	6	1	1	3	1	....	....
Fracture, middle third	4	1	....	....	....	5	....	4	....	1	....	....
Fracture, lower third	2	....	....	....	....	2	1	....	1	....	....	....
Knee joint	3	4	1	....	....	8	1	1	5	....	1	....
Leg:												
Flesh	10	27	4	....	....	41	2	3	6	7	18	1
Fracture	6	9	1	....	....	16	2	2	4	3	4	....
Ankle joint	1	....	....	....	....	1	1	....	....	....	....	....
Foot flesh	1	13	1	....	....	15	....	....	3	1	10	....
Tarsus and metatarsus, fracture	1	7	1	....	....	9	....	1	6	1	1	....
Toes, fracture	1	5	....	....	....	6	....	....	1	4	....	1
Wounds not described	3	....	....	....	....	3	....	....	....	3	....	....
Total	146	273	44	6	6	475	48	29	108	91	126	14

C 3.—*All gunshot wounds (exclusive of deaths not on sick report).*

REGULAR AND VOLUNTEER ARMIES, 1901.

Nature of missile.													Disposition.									
Blank cartridge.	Fragment of bullet.	Fragment of jacket of bullet.	Explosion of cartridge.	Explosion of shell.	Explosion of hand mortar.	Explosion of primer.	Slugs.	Shrapnel.	Powder.	Breech block.	Fragments of burst rifle.	Total.	Duty.	Certificates of disability.	Died.	Discharged by order.	Expiration of term of service and muster out.	Missing in action.	Deserted.	Death, other causes.	Remaining last report.	Total.
....	....	....	1	....	....	....	....	....	....	....	....	6	6	....	....	....	....	....	....	....	....	6
....	....	....	1	....	....	....	....	....	....	....	....	10	1	3	6	....	....	....	....	....	....	10
....	2	....	1	3	1	....	....	....	3	....	1	19	17	1	....	....	....	....	....	....	1	19
....	....	....	....	....	....	....	....	....	....	....	....	5	2	1	2	....	....	....	....	....	....	5
....	....	....	....	....	....	....	1	....	....	....	....	3	3	....	....	....	....	....	....	....	....	3
....	....	....	....	....	....	....	....	....	....	....	....	2	....	....	2	....	....	....	....	....	....	2
....	....	....	....	1	....	....	1	....	....	....	....	16	16	....	....	....	....	....	....	....	....	16
....	....	....	....	....	....	....	....	....	2	....	....	22	12	3	7	....	....	....	....	....	....	22
....	....	....	....	....	....	....	....	....	....	....	....	7	7	....	....	....	....	....	....	....	....	7
....	....	....	....	1	....	....	....	....	....	....	....	17	2	1	[a]13	....	1	....	....	....	....	17
....	....	....	....	....	....	....	....	....	....	....	....	2	2	....	....	....	....	....	....	....	....	2
....	....	....	....	....	1	....	1	....	....	....	....	13	13	....	....	....	....	....	....	....	....	13
....	....	....	....	....	....	....	....	....	....	....	....	3	2	....	1	....	....	....	....	....	....	3
....	....	....	....	1	....	....	1	1	....	....	....	12	12	....	....	....	....	....	....	....	....	12
....	....	....	....	....	....	....	....	....	....	....	....	1	1	....	....	....	....	....	....	....	....	1
....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	1	....	....	....	....	....	1
....	....	....	3	1	....	....	....	....	1	1	....	19	18	1	....	....	....	....	....	....	....	19
....	....	....	....	1	....	....	....	....	1	....	....	6	3	2	1	....	....	....	....	....	....	6
....	....	1	....	....	....	....	....	....	....	....	....	8	3	3	....	....	1	....	....	....	1	8
....	....	2	1	1	....	....	1	....	....	....	....	26	25	....	....	1	....	....	....	....	....	26
....	....	....	....	1	....	....	....	....	3	....	....	10	3	5	1	....	....	....	....	....	1	10
....	....	....	....	....	....	....	....	....	....	....	....	2	1	....	1	....	....	....	....	....	....	2
1	....	....	1	....	....	2	....	....	2	....	....	41	39	1	....	....	1	....	....	....	....	41
....	....	....	....	....	....	....	....	....	....	....	....	13	11	1	....	....	....	....	....	....	1	13
....	....	....	....	....	....	....	....	....	....	....	....	40	29	9	....	....	1	....	1	....	....	40
2	....	....	....	1	1	....	....	1	....	....	....	59	51	1	3	....	3	....	....	....	1	59
....	....	....	....	....	....	....	....	....	....	....	....	6	1	2	1	....	1	....	....	....	1	6
....	....	....	....	....	....	....	....	....	....	....	....	5	1	1	2	....	....	....	....	....	1	5
....	....	....	....	....	....	....	....	....	....	....	....	2	....	1	....	....	....	....	....	....	1	2
....	....	....	....	....	....	....	....	....	....	....	....	8	2	1	[a]4	1	....	....	....	....	....	8
....	....	....	1	1	....	....	2	....	....	....	....	41	39	....	....	....	1	....	....	[b]1	....	41
....	....	....	....	....	1	....	....	....	....	....	....	16	7	6	....	....	2	....	....	....	1	16
....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	....	....	....	....	....	....	....	1
....	....	....	....	....	....	....	....	1	....	....	....	15	15	....	....	....	....	....	....	....	....	15
....	....	....	....	....	....	....	....	....	....	....	....	9	5	4	....	....	....	....	....	....	....	9
....	....	....	....	....	....	....	....	....	....	....	....	6	4	1	....	....	1	....	....	....	....	6
....	....	....	....	....	....	....	....	....	....	....	....	3	....	....	....	....	1	2	....	....	....	3
3	2	3	9	12	4	2	7	3	12	1	1	475	353	49	[c]44	3	13	2	1	1	9	475

[a] One of these died in 1902.
[b] Septicemia appeared. Died from chloroform during amputation of leg.
[c] Two of these died in 1902.

D 1.—*Gunshot wounds which terminated fatally (exclusive of deaths not on sick report).*

REGULAR ARMY, 1901.

Character and location of wound.	How received.					Nature of missile.							
		Not in action.				In action.				Not in action.			
	In action.	In line of duty.	Suicide.	Homicide.	Total.	Mauser.	Remington.	Krag-Jörgensen.	Bullet, not stated.	Krag-Jörgensen.	Bullet, not stated.	Revolver.	Explosion of shell.	Powder.
Head, fracture	1	4	....	....	[a]5	1	....	....	....	1	....	2	1	....
Face, fracture	1	....	....	....	[b]1	....	1	....	....	....	....	....	....	....
Spine, fracture	....	2	....	....	[c]2	....	....	....	....	1	....	1	....	....
Thorax, penetrating	3	3	1	....	7	1	1	....	1	1	....	1	....	2
Abdomen, penetrating	1	6	1	2	[d]10	1	....	....	....	4	1	3	1	....
Perineum, genital and urinary organs	....	1	....	....	[e]1	....	....	....	....	....	....	1	....	....
Arm, fracture	....	1	....	....	[f]1	....	....	....	....	....	....	....	1	....
Forearm, fracture	1	....	....	....	[g]1	....	1	....	....	....	....	....	....	....
Wrist joint	....	1	....	....	[h]1	....	....	....	....	....	....	1	....	....
Thigh:														
Flesh	....	1	....	1	[i]2	....	....	....	....	1	1	....	....	....
Fracture, upper third	1	....	....	....	[j]1	....	1	....	....	....	....	....	....	....
Fracture, middle third	2	....	....	....	[k]2	....	2	....	....	....	....	....	....	....
Kneejoint	1	3	....	....	[l]4	....	....	1	....	3	....	....	....	....
Total	11	22	2	3	38	3	6	1	1	11	2	9	3	2

[a] Removal of fragments of bone in three cases.

[b] Wounded Sept. 23. Suture of cheek, tongue, and soft tissues of palate, Sept. 28. Removal of hard palate right side, including palate bone; also right alveolar process superior, and lower right maxillary from coronary process to symphisis, Oct. 28. Died of septicemia, Nov. 8.

[c] Death from paralysis of muscles of respiration in one case, ascending degeneration of cord in the other.

[d] Laparotomy in two cases; nephrectomy and suturing of colon in another.

[e] Bladder stitched to abdominal wound and siphon drainage inserted.

[f] Severe wounds arms and chest from premature explosion of 7-inch shell. Amputation right forearm, upper third, and left arm, lower third. Died on day of injury.

[g] Wounded Sept. 24. Bullet removed Sept. 25. Amputation of arm at junction of upper and middle thirds Oct. 9. Died of septicemia and secondary hemorrhage Oct. 31.

[h] Wounded Aug. 28. Report says: "Died Sept. 10 of exhaustion resulting from profound nervous depression and mental worry. Death was not in any way directly dependent upon the wound itself. Injury, however, is serious."

[i] Tetanus in one case: the femoral artery severed in the other.

[j] Died of shock.

[k] In one case the wound occurred Mar. 23; fragments of bullet and bone removed Mar. 24. Amputation of thigh Mar. 29. Died Mar. 29 from shock from operation and septicemia. In the other case, death from septicemia.

[l] Tetanus in one case. In another, removal of shattered bone and resection of kneejoint; death from septicemia and shock. In another, wounded Oct. 27, 1901; amputation at junction of middle and upper thirds of thigh for necrotic joint Jan. 30, 1902. Death from septicemia Jan. 30, 1902. In the other, heads of fibula and tibia ground into fragments; femur splintered; sciatic nerve torn and popliteal artery cut. Amputation upper third of thigh. Death from shock and exhaustion

D 2.—*Gunshot wounds which terminated fatally (exclusive of deaths not on sick report).*

VOLUNTEER ARMY, 1901.

Character and location of wound.	How received.			Nature of missile.					
		Not in action.		In action.				Not in action.	
	In action.	In line of duty.	Total.	Mauser.	Remington.	Bullet, not stated.	Krag-Jörgensen.	Bullet, not stated.	
Head, fracture	....	1	1	....	....	....	....	....	1
Face, fracture	....	1	[a]1	....	....	....	....	1	....
Abdomen, penetrating	3	....	3	1	1	1	....	....	....
Thigh, flesh	1	....	[b]1	....	1	....	....	....	....
Total	4	2	6	1	2	1	1		1

[a] Entrance 1 inch below tip of chin; exit under left eye; died next day after injury.

[b] Cutting femoral artery.

D 3.—*Gunshot wounds which terminated fatally* (exclusive of deaths not on sick report).

REGULAR AND VOLUNTEER ARMIES [illegible]

Character and location of wound.	How received.					Nature of missile.								
			Not in action.			In action.				Not in action.				
	In action.	In line of duty.	Sick in quarters.	Sick in hospital.	Total.	Musket.	Rifle.	Long-barreled gun.	Bullet, not stated.	Rifle, [illegible].	Bullet, not stated.	Revolver.	Explosion or fall.	Powder.
Head, fracture	1	5	....	....	6	1	....	....	....	....	4	2	1	....
Face, fracture	1	1	....	....	2	....	1	....	....	....	....	....	....	....
Spine, fracture	....	2	....	....	2	....	....	....	....	....	....	1	....	....
Thorax, penetrating	4	3	1	....	8	1	1	....	1	1	....	1	....	2
Abdomen, penetrating	4	6	1	2	13	2	1	....	....	4	1	3	1	....
Perineum, genital and urinary organs	....	1	....	....	1	....	....	....	....	....	....	1	....	....
Arm, fracture	....	1	....	....	1	....	....	....	....	....	....	....	1	....
Forearm, fracture	1	....	....	....	1	....	1	....	....	....	....	....	....	....
Wrist joint	....	1	....	....	1	....	....	....	....	....	....	1	....	....
Thigh:														
Flesh	1	1	....	1	3	....	1	....	....	1	1	....	....	....
Fracture, upper third	1	....	....	....	1	....	1	....	....	....	....	....	....	....
Fracture, middle third	2	....	....	....	2	....	2	....	....	....	....	....	....	....
Kneejoint	1	3	....	....	4	....	....	1	....	1	....	....	....	....
Total	15	24	2	3	44	4	8	1	2	12	1	9	2	2

E.—*Surgical operations for gunshot wounds.*

REGULARS AND VOLUNTEERS, 1901.

Character and location of wound.	Operation.	Result.		
		Recovered.	Died.	Remaining, last report.
Head, fracture	Removal of necrosed bone and a portion of roof of orbit right eye.	1		
Do	Removal of 50 to 100 small fragments of bone and considerable lacerated brain tissue.		1	
Do	Removal of detached pieces of skull and lacerated part of brain.		1	
Do	Removal of fragments of bone and a portion of bullet from brain.		1	
Face:				
Flesh	Enucleation of eye	2		
Fracture	Suture of cheek, tongue, and soft tissues of palate Sept. 28; removal of hard palate, right side, including palate bone, also right alveolar process superior and lower right maxillary from coronary process to symphisis Oct. 28; died Nov. 8 of septicemia.		1	
Thorax:				
Nonpenetrating	Wounded in 1900; operation for necrosis Aug. 28, 1901; eleventh rib exposed; 4 inches removed, including superficial periosteum; plastic operation with skin flaps.	1		
Penetrating	2¼ liters bloody fluid aspirated from left pleural cavity Nov. 10; large amount of purulent fluid withdrawn and drainage tube inserted Nov. 25; thoracoplasty to obliterate cavity between collapsed lung and chest wall; removal of 2½ inches each from third, fourth, fifth, and sixth ribs Dec. 27.	1		
Do	Immediate ligation of an intercostal artery; pleural cavity aspirated 3 weeks later.	1		
Do	Infusion of hot sterile normal saline solution	1		
Do	Bullet removed	2		
Abdomen, penetrating	Laparotomy		2	
Do	Nephrectomy and suture of colon		1	
Pelvis, fracture	Wounded Feb. 22; bullet extracted Feb. 24; abscess opened Apr. 30; 2 pieces loose bone removed July 22.	1		
Perineum, genital and urinary organs.	Bladder stitched to abdominal wound and siphon drainage inserted.		1	
Arm, flesh	Musculo-spiral nerve freed by incision	1		
Do	Ulnar and cutaneous nerves liberated from cicatricial tissue.	1		
Arm, fracture	Wounded in 1900; sinus opened and curetted; fragment necrosed bone removed Jan. 29, 1901; sinus opened and curetted; fragment necrosed bone and 2 fragments of bullet removed Sept. 20, 1901.	1		
Do	Removal of bullet and fragments of bone	1		
Do	Amputation upper third right forearm and lower third left arm; died on day of injury from severe wounds of arms and chest.		1	
Elbow joint	Removal of necrosed bone	2		
Do	Removal of shattered bone	2		
Do	Amputation arm, middle third	1		
Do	Removal of fragment of jacket of bullet	1		
Forearm, flesh	Wounded in 1900; nerve embedded in scar tissue freed, raised, and stretched Jan. 28, 1901.	1		
Do	Suture of flexor tendons and ligation of radial artery Jan. 1, 1902.	1		
Forearm, fracture	Bullet removed	1		
Do	Wounded Sept. 24; bullet removed Sept. 25; amputation arm at junction upper and middle thirds Oct. 9; died Oct. 31 from septicemia and secondary hemorrhage.		1	
Do	Amputation forearm	3		[a] 1
Do	Wounded in 1899; ununited ends ulnar bone wired Feb. 8, 1901.	1		
Do	Bones curetted; callus radius removed July 1, 1901 (wounded in 1900; resection of radius in 1900 as noted in last annual report).	1		
Carpus and metacarpus, fracture.	Removal of shattered bone	1		
Do	Removal of fragments of bone Jan. 25, 1901, and subsequent amputation of 2 fingers in 1902.	1		
Do	Amputation of finger and metacarpal	1		[a] 1

[a] Remaining in hospital April 30, 1902.

E.—*Surgical operations for gunshot wounds.*

REGULARS AND VOLUNTEERS, 1901.

Nature of missile.										
Mauser.	Remington.	Krag-Jörgensen.	Bullets, not stated.	Revolver.	Small shot.	Fragment, jacket of bullet.	Explosion of cartridge.	Explosion of shell.	Explosion of hand mortar.	Powder.
1										
		1								
								1		
				1						
							1	1		
	1									
	1									
				1						
				1						
				1						
1				1						
				2						
		1								
	1									
				1						
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			1							
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		1						1		2
			1							
1										
			1							
		1								
		2								

E.—*Surgical operations for gunshot wounds*—Continued.

REGULARS AND VOLUNTEERS. 1901—Continued.

Character and location of wound.	Operation.	Result.		
		Recovered.	Died.	Remaining, last report.
Fingers, fracture	Finger amputation	20		
Do	Curettage for necrosis	1		
Thigh:				
Flesh	Incision 4 inches long posterior surface of thigh; dense scar tissue found to be adherent to and constricting sciatic nerve; scar tissue dissected out.	1		
Fracture, upper third	Removal of fragments of bone	1		[a] 1
Do	Wounded June 20; shattered bone removed July 18; amputation of thigh through anatomical neck of femur Nov. 21.	1		
Thigh, fracture:				
Middle third	Fragments of bone removed	1		
Do	Fragments of bone removed and ends of bone wired together.			[b] 1
Do	Wounded Mar. 23; fragments of bullet and bone removed Mar. 24; amputation thigh Mar. 29; died Mar. 29 from shock of amputation and septicemia.		1	
Lower third	Wounded in 1900; bony callus removed and ends of bone wired Mar. 21, 1901; amputation of thigh June 8, 1901.	1		
Do	Wounded Oct. 16, 1901; amputation thigh, middle third, for necrosis Feb. 5, 1902.			[b] 1
Do	Wounded Sept. 11, 1900; sequestrotomy June 17, 1901.	1		
Kneejoint	Resection of joint	1		
Do	Removal of shattered bone and resection of joint; death from septicemia and shock.		1	
Do	Wounded Oct. 27, 1901; amputation thigh junction of middle and upper thirds for necrotic joint Jan. 30, 1902; died Jan. 30, 1902, from septicemia.		1	
Do	Heads of fibula and tibia ground into fragments; femur splintered; sciatic nerve torn and popliteal artery cut; amputation thigh upper third; died from shock and exhaustion.		1	
Do	Wounded Mar. 21, 1901; wound opened and fractured portion resected Sept. 17, 1901; arthrectomy Jan. 20, 1902.	1		
Leg:				
Flesh	Wounded Nov. 20; septicemia appeared; death Nov. 24, from chloroform during amputation of leg.		1	
Fracture	Carious bone removed Apr. 22; amputation leg, upper third, Aug. 20.	1		
Do	Wound curetted and necrosed bone removed	1		
Do	Removal of sequestrum	1		
Do	Removal of bone fragments and pieces of cloth	1		
Do	Amputation below knee	1		
Do	Amputation leg, junction of middle and upper thirds.	1		
Do	Wounded July 13, 1900; amputation thigh, lower third. Nov. 30, 1901, for ankylosis knee, with multiple abscesses.[c]	1		
Do	Bullet removed	2		
Tarsus and metatarsus, fracture.	Wounded May 31; amputation leg, middle upper third. Oct. 11.[d]	1		
Do	Toe amputation	3		
Do	Removal of bullet	1		
Toes, fracture	Toe amputation	5		
Total		79	15	5

[a] Remaining in hospital June 30, 1902.
[b] Remaining in hospital April 30, 1902.
[c] There was no hospital record of involvement of joint and multiple abscesses on file at date of last annual report.
[d] Hospital records give no cause for this high operation.

NOTE.—There was recovery in all (10) cases remaining in hospital after surgical operations for gunshot wounds at date of last annual report.

E.—*Surgical operations for gunshot wounds*—Continued.

REGULARS AND VOLUNTEERS, 1901—Continued.

Nature of missile.										
Mauser.	Remington.	Krag Jorgensen.	Bullets, not stated.	Revolver.	Small shot.	Fragment, jacket of bullet.	Explosion of cartridge.	Explosion of shell.	Explosion of hand mortar.	Powder.
		11	3	3	3					
			1							
			1							
1		1								
			1							
			1							
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	1									
		1							1	
			1							
		1		1						
		1								
	1									
		2	1							
		1	3		1					
5	13	32	19	17	4	1	1	1	1	2

Special surgical reports rendered to June 30, 1902.

Name.	Rank.	Report.
Ashburn, P. M	First lieutenant, assistant surgeon.	Appendicitis, syphilis. Report of surgical work for fiscal year ending June 30, 1902.
Arthur, Wm. H	Major, surgeon	Report of surgical work done at military hospital, Dagupan, P. I., December, 1900, to December, 1901.
Baird, W. F	Contract surgeon	Report of rectal cases treated January, 1899, to April, 1902.
Bannister, John M	Major, surgeon	Operations for radical cure of hernia, 5 cases. Operations for appendicitis, 21 cases.
Barney, C. N	First lieutenant, assistant surgeon.	Report of surgical work for fiscal year ending June 30, 1902.
Barry, Edmund	Contract surgeon	Do.
Bevans, J. N	First lieutenant, assistant surgeon.	Do.
Borden, W. C	Major, surgeon	Gunshot wound left femur. Abscess of liver and brain. Operations for radical cure of hernia, 22 cases. Report of surgical work for fiscal year ending June 30, 1902.
Brownlee, C. Y	First lieutenant, assistant surgeon.	Report of surgical work for fiscal year ending June 30, 1902.
Buford, Oliver H	Contract surgeon	Do.
Bushnell, G. W	Major, surgeon	Otitis media. Report of surgical work for fiscal year ending June 30, 1902.
Byrne, John G	Contract surgeon	Report of surgical work for fiscal year ending June 30, 1902.
Chamberlain, W. P	First lieutenant, assistant surgeon.	Operations for the radical cure of hernia, 4 cases; varicocele, 1 case; gunshot wound of chest, 2 cases. Operation for blood cyst of neck. Operation for radical cure of hemorrhoids. Report of surgical work for fiscal year ending June 30, 1902.
Combe, J. K	Contract surgeon	Report of surgical work for fiscal year ending June 30, 1902.
Comegys, E. T	Major, surgeon	Do.
Crosby, W. D	do	Do.
Davies, Wm. O	Captain, assistant surgeon, volunteers.	Cholecystotomy.
Davis, O. F	Contract surgeon	Report of surgical work for fiscal year ending June 30, 1902.
Ebert, R. G	Major, surgeon	Three cases of frostbite. Report of surgical work for fiscal year ending June 30, 1902.
Edie, Guy L	do	Report of surgical work for fiscal year ending June 30, 1902.
Ewing, C. B	do	Do.
Farr, C. W	First lieutenant, assistant surgeon.	Gunshot wound of abdomen. Operation for the radical cure of hernia. Report of surgical work for year ending June 30, 1902.
Fauntleroy, P. C	Captain, assistant surgeon	Operation for radical cure of hernia. Abscess of liver. Acute gangrenous appendicitis. Report of surgical work for fiscal year ending June 30, 1902.
Field, P. C	First lieutenant, assistant surgeon.	Report of surgical work for fiscal year ending June 30, 1902.
Fisher, Henry C	Captain, assistant surgeon	Do.
Flagg, C. E. B	do	Gunshot wound of abdomen. Ovariotomy. Operations for appendicitis, 2 cases. Cœliotomy for contusion of abdomen (kick of horse). Report of surgical work for fiscal year ending June 30, 1902.
Forwood, W. H	Surgeon-General	Operations for radical cure of hernia, 2 cases.
Frick, E. B	Captain, assistant surgeon	Report of surgical work for fiscal year ending June 30, 1902.
Girard, A. C	Lieutenant-colonel, deputy surgeon-general.	Report of surgical cases, June and July, 1901. Surgical operations during November, 1901. Surgical operations October, 1901, to February, 1902.
Girard, J. B	do	Report of surgical work for fiscal year ending June 30, 1902.
Gregory, Wm. F	Contract surgeon	Do.
Hartnett, E. H	First lieutenant, assistant surgeon.	Do.
Heffenger, A. C	Contract surgeon	Do.
Hess, L. T	First lieutenant, assistant surgeon.	Amputation of leg for gangrene.
Hewitt, John M	Contract surgeon	Emergency herniotomy and enterectomy with secondary enterostomy and occlusion of a portion of the ileum.[a]
Hodson, F. A	do	Report of surgical work for fiscal year ending June 30, 1902.
Holliday, F. A	do	Do.

[a] Published in the Journal, Surgical Association of Military Surgeons.

Special surgical reports rendered to June 30, 1902—Continued.

Name.	Rank.	Report.
Howard, D. C	Captain, assistant surgeon	Appendicitis, 3 cases. Operations for radical cure of hernia, 2 cases; disarticulation at shoulder joint for traumatic gangrene. Traumatic rupture, sartorius muscle, with immediate suture. Operations for varicocele, 2 cases. Traumatic epilepsy, trephining for. Amputation upper third right leg. Arthrectomy for suppurative arthritis, right knee. Gunshot wound left shoulder, extraction of bullet. Operations for internal hemorrhoids, clamp and cautery, 3 cases. Report of surgical operations, Feb. 1 to Apr. 15, 1902.
Hoyt, Henry F	Major, surgeon, volunteers	Report of surgical work for fiscal year ending June 30, 1902.
Ives, Frank J	Major, surgeon	Do.
Jones, John F	Contract surgeon	Do.
Keefer, F. R	Major, surgeon	Do.
Kendall, Wm. P	....do	Do.
Kirkpatrick, T. J	Captain, assistant surgeon	Do.
Kulp, John S	....do	Do.
La Garde, Louis A	Major, surgeon	Operations for radical cure of hernia, 7 cases.
Lando, M. E	First lieutenant, assistant surgeon.	Report of surgical work for fiscal year ending June 30, 1902.
Leinhart, John	Contract surgeon	Bronchitis, osteo-myelitis.
Lewis, Wm. F	Captain, assistant surgeon	Report of surgical work for fiscal year ending June 30, 1902.
Lyster, T. C	First lieutenant, assistant surgeon.	Do.
Mason, C. F	Major, surgeon	Varicocele. Operation for radical cure of hernia. Varicose veins of leg. Report of surgical operations September to December, 1901. Report of surgical operations for quarter ending Mar. 31, 1902. Treatment of chancroidal buboes. Appendicitis. Report of surgical work for fiscal year ending June 30, 1902.
Menage, H. C	Contract surgeon	Report of surgical work for fiscal year ending June 30, 1902.
Merrick, J. N	....do	Do.
Miller, J. E	....do	Do.
Mittelstaedt, C. B	....do	Tetanus.
Morse, A. W	First lieutenant, assistant surgeon.	Report of surgical work for fiscal year ending June 30, 1902.
Newgarden, G. J	Captain, assistant surgeon	Do.
Page, Henry C	First lieutenant, assistant surgeon.	Do.
Perley, H. O	Major, surgeon	Do.
Richard, Charles	....do	Operations for radical cure of hernia, 15 cases.
Richards, A	Contract surgeon	Report of surgical work for fiscal year ending June 30, 1902.
Richardson, G. H	First lieutenant, assistant surgeon.	Do.
Roberts, Wm. M	....do	Do.
Schreiner, E. R	....do	Do.
Shimer, Ira A	....do	Do.
Shockley, M. A. W	....do	Do.
Shaw, Herbert G	....do	Do.
Stark, A. N	Captain, assistant surgeon	List of surgical operations, West Point, N. Y., March to June, 1902.
Stone, J. H	....do	Operations for radical cure of hernia, 2 cases. Gunshot wound of chest, suicide. Gunshot wound of right thigh.
Straub, P. F	....do	Report of surgical work for fiscal year ending June 30, 1902.
Taylor, B. D	Lieutenant-colonel, deputy surgeon-general.	Do.
Ten Eyck, B. L	Major, surgeon	Operations for radical cure of hernia, 3 cases. Report of surgical work for fiscal year ending June 30, 1902.
Tenney, E. R	Contract surgeon	Circumcision for elongated prepuce.
Thornburg, R. M	First lieutenant, assistant surgeon.	Report of surgical work for fiscal year ending June 30, 1902.
Torney, G. H	Major, surgeon	Do.
Trenholtz, C. A	Contract surgeon	Do.
Vaughn, Milton	Captain, assistant surgeon, volunteers.	Gunshot wound, right thigh.
Wells, George M	Captain, assistant surgeon	Gastric ulcer. Report of surgical work for fiscal year ending June 30, 1902.
Wickline, W. A	Contract surgeon	Report of surgical work for fiscal year ending June 30, 1902.

Special surgical reports rendered to June 30, 1902—Continued.

Name.	Rank.	Report.
Willcox, Charles	Major, surgeon	Amputation upper third thigh, for gunshot wound. Amputation at shoulder joint for gunshot wound. Amputation upper third arm for bolo wound. Operations for radical cure of hernia, 2 cases. Myostosis ossificans. Acute gangrenous appendicitis. Suprapubic operations for varicocele, 14 cases.
Winter, F. A.	Captain, assistant surgeon	Report of surgical work for fiscal year ending June 30, 1902.
Woodruff, C. E	Major, surgeon	Operation for radical cure of hernia.
Wolfe, Edwin P.	First lieutenant, assistant surgeon.	List of surgical operations performed at Fort Hamilton, N. Y., November, 1900, to November, 1901. Inguinal adenitis.

THE GENERAL HOSPITALS.

ARMY AND NAVY GENERAL HOSPITAL, HOT SPRINGS, ARK.

In the officers' division of this hospital there remained under treatment June 30, 1901, only 1 officer, he belonging to the Regular Army. During the fiscal year ended June 30, 1902, there were admitted for treatment 21 officers on the active list of the Army, 4 on the retired list of the Army, 3 on the active list and 2 on the retired list of the Navy, with 1 belonging to the United States Marine-Hospital Service, making a total of 32, including the 1 remaining over from last year. Of these 32 officers, 27 were returned to duty or to their residence, 1 died, and 4 remained under treatment June 30, 1902. The 27 officers who recovered sufficiently to resume their duties or were much benefited were under treatment from 6 to 178 days, giving an average of 69.25 days. The maximum number was 14, in the month of March, 1902. During August and October, 1901, no officer was at the hospital under treatment.

In the enlisted men's division there remained under treatment June 30, 1901, 53 enlisted men of the Army and 15 ex-volunteers, and as 316 such men were admitted during the year there were 384 men to be accounted for, as follows:

Discharged on certificates of disability in line of duty	42	
Discharged for disability not in line of duty	27	
Discharged without honor	2	
Discharged by expiration of term	16	
Discharged by order	1	
Deserted	2	
Retired	1	
Transferred to other hospitals	3	
Died	2	
Returned to duty	108	
		204
Ex soldiers and sailors of the United States who left the hospital during the fiscal year:		
Cured or improved	85	
Not benefited	38	
		123
Remaining in hospital June 30, 1902:		
Enlisted men of the Army and Navy	50	
Ex soldiers and sailors	7	
		57
		384

The admissions during the fiscal year ended June 30, 1902, were distributed as to disease as follows:

Various forms of rheumatism	178
Diseases of the digestive organs	35
Diseases of the nervous system	30
Malarial diseases	7
Other diseases	66
Total	316
Number of cases treated during the fiscal year 1901	438
Number of cases treated during the fiscal year 1902	345

UNITED STATES GENERAL HOSPITAL, FORT BAYARD, N. MEX.

See under the heading "Consumption," p. 68, supra.

UNITED STATES GENERAL HOSPITAL, WASHINGTON BARRACKS, D. C.

During the fiscal year the general hospital at Washington Barracks has served also as the post hospital at that post.

During this period 544 cases were treated, 434 medical and 110 surgical. Three of the former proved fatal. Ninety-one operations were performed in the 110 surgical cases, 2 of which ended fatally. The following tabulation gives the surgical cases:

Diagnosis.	Number of cases treated.	Operations.	Deaths.
Hernia	26	22	
Appendicitis	10	4	
Hemorrhoids	7	4	
Varicocele	3	3	
Phimosis	9	9	
Sarcoma, upper jaw	1	1	
Epithelioma, upper jaw	1	1	1
Adenitis:			
Inguinal	12	9	
Cervical	1		
Submaxillary	1		
Wounds:			
Gunshot	1		
Gunshot, osteitis with sinus	3	3	
Gunshot, lodged missile	1	1	
Incised, right kneejoint	1	1	
Incised, foot	1	1	
Fracture, right clavicle	1		
Dislocation, right shoulder joint	1	1	
Semilunar cartilages, knee	1	1	
Tubercular lymphangitis	1	1	
Ingrowing toe nails	4	4	
Abscess:			
Liver	1	3	1
Alveolar	2	2	
Psoas	1	1	
Ischiorectal	2	2	
Left buttock	2	2	
Carbuncle	1	1	
Cellulitis	2	2	
Cysts, sebaceous	1	1	
Hydrocele, right testicle	1	1	
Scar, contracting	1	1	
Adhesions, appendicial	1	1	
Stricture, œsophagus	1	2	
Pyelitis-pyonephrosis	1	2	
Necrosis, upper jaw	1	1	
Pterygium, left eye	1	1	
Bolo wound, left forearm	1	2	
Total	110	91	2

As the officer commanding the hospital also served as professor of military surgery in the Army Medical School, clinics were given every Saturday during the school term, which were attended by class sections, thus familiarizing the student officers with the surgical technique adapted to military hospitals. As the hospital is equipped with Röntgen ray apparatus, this was used in instructing the student officers in the theory and practice of Röntgen ray work.

During the year practically the same course of instruction has been carried on with the company of instruction attached to the hospital as in the previous year. Four hundred and forty-five enlisted men have joined the company of instruction during the fiscal year, making a total of 2,462 enlisted men who have been instructed in the company since the establishment of the general hospital in 1898.

The officer in command of the company of instruction also served as instructor in first aid and Hospital Corps drill in the Army Medical School during the last session, thus enabling the company of instruction to be utilized for the purpose of instructing the student officers not only in drill, but in the establishment of field hospitals and in familiarizing them with the equipment of the Medical Department both in garrison and in the field.

The necessity for a general hospital in or near the city of Washington has been so great that in reply to a communication from the Adjutant-General's Office, dated July 8, 1902, requesting to be informed of the needs of the service for the expenditure of the appropriation of $200,000 for the United States general hospitals under the appropriation act of the present year, the Surgeon-General stated that the $200,000 appropriated would be required for the construction, repairs, and expenses connected with the general hospitals at Fort Bayard, N. Mex., the Presidio of San Francisco, Cal., and Washington Barracks, D. C.

The construction of a new general hospital in the District of Columbia is necessary to take the place of the present small hospital at Washington Barracks. The interests of the service would be promoted by maintaining a general hospital in or near the city of Washington equipped with all modern appliances for the best medical and surgical work. In regard to the location of such a hospital it is recommended that Congress be asked to grant authority to establish it on the lands of the United States Soldiers' Home, a suitable place for which may be found just within the southern boundary and near the south gate of these grounds. If it is not deemed advisable to recommend this proposition, a site may be secured by the purchase of lands fronting on Connecticut avenue beyond Rock Creek bridge or elsewhere in the District. About 25 or 30 acres would be required for the hospital and for the hospital school of instruction which should be associated with it.

In view of section 1136 of the Revised Statutes, which forbids the erection of any permanent building at a cost of more than $20,000 without special authority from Congress, I respectfully request that the necessary authority be asked for to expend $140,000, or as much thereof as may be necessary, for the erection of this hospital.

A general hospital is needed in or near this city—

(*a*) For the treatment of special cases.

Cases continually arise in the military service for which post hospitals do not furnish the necessary facilities for treatment. These cases are mainly difficult surgical cases requiring treatment by a

specialist. A general hospital should have all facilities and should have attached to it medical officers having special knowledge and experience.

The general hospital is necessary also for the observation of officers ordered before a retiring board, as the careful examination which may be given to an officer in a fully equipped hospital will more efficiently determine his physical condition than the examination made at a post hospital.

(*b*) For instruction in connection with the Army Medical School.

In England the Royal Victoria Hospital, which cares for disabled men returned from all the outlying colonies, is practically an attachment to the Army Medical School at Netley, but our Army Medical School has at present no such great advantage as an associated hospital for army diseases from distant and tropical service.

A general hospital would enable student officers to become familiar with the methods of administering general hospitals, to instruct them in methods of hospital inspection, the use of the Röntgen ray apparatus and other diagnostic apparatus, and to instruct them in medical and surgical procedures as they are adapted to the military service.

It would give facilities for the practical training of men in the Hospital Corps from the company of instruction in Hospital Corps work. A general hospital with its varied medical and surgical work is especially adapted to practical training. It would place a company of instruction of the Hospital Corps at the disposal of the Surgeon-General for the instruction of student officers in Hospital Corps drill, the pitching of field hospitals and familiarize them with Hospital Corps equipment and medical supplies.

(*c*) For extension in time of war.

With a general hospital established and a company of instruction attached thereto, everything is in readiness at the outbreak of war to immediately extend the institution to any desired size and to accommodate any desired number of patients. This without the trouble, inconvenience, and delay incident to establishing such a hospital de novo.

The functions of a general hospital are so much more extensive and so different from those of a post hospital that they can not be properly conducted in connection with a hospital having post functions. In a post the medical officers and enlisted men are all directly under the command of the local commander, and all official communications and business have to be transacted through the department to which the post belongs. The functions which would particularly obtain with a general hospital in the city of Washington are such that the establishment should be directly under the control of the Surgeon-General and Secretary of War. Patients and officers sent to the hospital for special treatment can be brought in direct touch with the War Office. The assignment of men to the company of instruction for a course of instruction for the Hospital Corps and the sending of men, when instructed, to other posts, can be best managed direct and not through a department commander. Also, the institution being in direct communication with the Surgeon-General can be properly used for instruction in connection with the Army Medical School and its work can be adapted to the school curriculum which can not be satisfactorily done in a hospital under post control.

It is believed that the interests of the service would be subserved by attaching the attending surgeon in the city of Washington to the hospital as a visiting surgeon, so that he might have at his disposal a

service hospital in which to treat those of his cases which require hospital treatment, with a minimum of expense to them. This would add to the number of cases in hospital and so increase its efficiency for training. At present the attending surgeon sends many cases to the local civil hospitals, and it is thought that the military service should hold control of its own cases.

GENERAL HOSPITAL, PRESIDIO OF SAN FRANCISCO, CAL.

A full report of the organization and management of this hospital was published in the reports of the Surgeon-General for the fiscal years 1900 and 1901.

The work done by this hospital during the past year has been of an exceedingly gratifying and satisfactory character. Estimates for material and labor have been promptly approved. With some minor additions this hospital can be made practically perfect, and certainly equal to the best of similar institutions in civil life.

The steam laundry connected with the hospital is in good working order and does all the necessary work for the various post hospitals in and around San Francisco and for the hospitals of transports.

The following shows the amount of work done during the year ended June 30, 1902:

In hospital June 30, 1901		139
Admissions during the year		4,551
		Per cent.
For gunshot wounds	56	= 1.25
For diarrhea and dysentery	1,032	=22.67
For malarial fevers	205	= 4.50
For typhoid fever	33	= .72
For rheumatism	151	= 3.31
For venereal diseases	272	= 5.97
For alcoholism	5	= .11
For insanity	146	= 3.20
For injuries	112	= 2.46
All other causes	2,539	=55.79
Total	4,690	
Returned to duty		2,795
Rate per 1,000 of admissions	614.00	
Rate per 1,000 last year	573.00	
Discharged for disability		401
Rate per 1,000 of admissions	88.00	
Rate per 1,000 last year	181.00	
Deaths from all causes		99
Rate per 1,000 of admissions	21.80	
Rate per 1,000 last year	33.58	
Deserted		48
Sent to Government Hospital for the Insane		130
Sent to the general hospital, Fort Bayard, N. Mex		147
Sent to the general hospital, Hot Springs, Ark		81
Otherwise disposed of		587
Remaining in hospital June 30, 1902		402
		4,690

Of the total admissions, 2,413 came from the Philippines and 2,138 from camps and garrisons in the United States.

Average monthly number of patients in hospital, 480.

Causes of deaths.

Chronic dysentery	24	Carcinoma	4
Broncho-pneumonia	20	Acute septicæmia	1
Pulmonary tuberculosis	8	Abscess of the liver	5
Lobar pneumonia	7	Interstitial nephritis	3
Chronic diarrhœa	3	Internal hemorrhage	2
Purpura hemorrhagica	2	Sarcoma	2
Appendicitis	2	Syphilis	3
General peritonitis	2	Ankylostomiasis	1
Miliary tuberculosis	1	Pyemia	1
Fibroid pneumonia	1	Cholecystitis	1
Endocarditis	1	Shock following amputation	1
Gunshot wounds	1	Empyema	1
Thoracic aneurism	1		
Lymphatic leukemia	1	Total	99

Causes of discharges for disability.

Infectious diseases	4	Diseases of muscles, bones, and joints	20
Diseases of the nervous system	34	Diseases of the skin	2
Diseases of the digestive system	22	Diseases of the eye	61
Diseases of the circulatory system	39	Diseases of the ear	64
Diseases of the respiratory system	13	Gunshot wounds	51
Diseases of the urinary organs	4	Injuries, general and local	81
Diseases of the lymphatic system	4	Miscellaneous, unclassified	2

As may be seen from the above tabulation, deaths were due mainly to chronic dysentery from the Philippines and from broncho-pneumonia. Although the former disease caused the greater number of deaths, the rate of mortality has really been low when the number of cases received is considered. The large death rate from broncho-pneumonia was a result of an epidemic of measles which prevailed among recruits en route to the Philippines.

The following is a list of the principal operations performed at this hospital during the year ended June 30, 1902, by Col. A. C. Girard, assistant surgeon-general, commanding:

Herniotomies	57
Inguinal	53
Ventral	2
Umbilical	2
Varicocele	35
Right	2
Left	33
Appendectomies	23
Resection of rib for empyema	7
Pleurisy with effusion	6
Hemorrhoids	31
Fistula in ano	3
Stricture in rectum	2
Exploratory abdominal sections	6
Perineal section for urinary fistula	1
Craniectomies	4
Traumatic epilepsy, bolo wound	1
Gunshot wound of skull	1
Depressed fractures	2
Enucleation of eye	2
Perineal cystotomy for vesical calculus	1
Castration	3

During the year the work done in the pathological laboratory of the hospital under the superintendence of Contract Surg. Charles F. Craig, U. S. Army, consisted of the following:

Examinations of blood	3,518
Examinations of urine	4,395
Examinations of sputa	1,221
Examinations of feces	1,319
Widal tests	63
Malta fever tests	14
Blood counts	123
Cultures	52
Sections from post-mortem material	542

Of the 3,518 examinations of the blood for malarial parasites, 175 proved positive. Of the positive cases 134 were due to the estivo-autumnal parasites, 33 to the tertian parasites, and 8 were combined infections. Of the 134 estivo-autumnal infections, 113 were due to the tertian estivo-autumnal parasite, 11 to the quotidian estivo-autumnal parasite, and 10 were combined infections or infections in which the type of parasite could not be exactly determined. The examinations of the blood during this year for malarial parasites have shown a marked decrease in the number of cases of malaria returned to this hospital from the Philippines.

Most of the 123 blood counts were made in cases of secondary anæmia, following either dysentery or malarial fever. The lowest blood count was 855,000 red cells to the cubic millimeter. This occurred in a case of pernicious secondary anæmia, following estivo-autumnal malaria, from which the patient died. Of the 123 counts, 55 were from cases suffering from secondary anæmia following malarial fever, and the others from cases of dysentery and diarrhea.

The urine was examined in all cases admitted to hospital. In cases which showed no pathological conditions the urine was not again examined unless requested by the pathologist or the medical officer in charge.

Of the 1,221 specimens of sputa examined for the bacillus of tuberculosis, 143 proved positive.

Of the 1,319 specimens of feces examined for the amœba of dysentery, 228 proved positive.

There were 63 Widal tests performed during the year. An investigation was carried on as to the etiology of these cases of typhoid, as it was thought that some of them might have originated in the camps at the Presidio. It was found, however, after thorough investigation that they were all contracted at other posts throughout the United States or in the Philippine Islands, and that none of the cases of typhoid sent to this hospital have originated at the Presidio.

Malta fever.—Fourteen tests were made in this hospital during the year for Malta fever by the agglutination reaction, of which 4 were positive.

Medical officers of the English army were the first to draw attention to a disease prevailing in Malta and other Mediterranean stations, possessing many of the symptoms of typhoid, but differing from that disease in important respects.

In 1816 Burnett[a] described very fully this disease, but regarded it as a remittent malarial fever. This view of the character of the fever was adhered to for many years, and it was not until 1878 that the dis-

[a] Burnett: Practical Account of the Mediterranean Fever, London, 1816.

tinction was clearly drawn between remittent malarial fever and Malta fever.

When first described the disease was supposed to be peculiar to the island of Malta, hence the name, but continued observation has proved that it is widespread throughout tropical and subtropical regions.

Thus Donaldson[a] describes cases in Gibraltar. Tomaselli in Sicily, Patterson in Constantinople, Oliver[b] along the banks of the Danube, Veal[c] in Cyprus, Musser[d] and Cox[e] in Porto Rico, Chamberlain,[f] Curry,[g] and Strong[h] in the Philippines.

Various opinions were held by observers as to the etiologic factor in the production of Malta fever, but it was not until the painstaking researches of Bruce were published in 1887 that anything positive was known. Bruce[i] demonstrated the cause of the disease to be a micrococcus, to which he gave the name *Micrococcus melitensis*.

Malta fever is generally a fever of long duration, subject to frequent relapses, presenting a most irregular and confusing temperature course, accompanied with severe pain in the joints, constipation, and profuse perspiration, and often followed by arthritic pains, with or without swelling of the joints. An enlarged and tender spleen is very common. Diagnosis of the disease has heretofore presented many difficulties, as it resembles in many instances typhoid or remittent malarial fever; and even with the help of the microscopical examination of the blood and the Widal test, the distinction between these diseases can not always be made. In 1897, however, Wright, of the Royal Army Medical School, England, discovered that the blood serum of a patient suffering from Malta fever will agglutinate the *Micrococcus melitensis* in very dilute solution, and that this agglutination test is most delicate and can be depended upon absolutely in diagnosis.

In Wright's method of using the serum test sedimentation tubes having a diameter of less than 1 millimeter and an agar culture of the micrococcus are used. A salt solution suspension is made, and this solution is used to dilute the blood serum, the dilution varying according as the test is desired to be more or less delicate. It makes no difference whether the micrococci are alive or dead, the agglutination reaction takes place as well with one as the other.

Curry's method.—Curry's method of performing the test, as described by him ("Malta fever," Journal of Medical Research, vol. 6, No. 1), differs somewhat from that of Wright, and is thus described by him:

> I used common glass tubing about 3 to 4 mm. in diameter, and made the observations microscopically, and as a control made microscopical observations of drops of the fluid withdrawn by means of a platinum loop from the top, middle, and bottom of the tube. Tubes 7.5 cm. long and 3 to 4 mm. in diameter were made from glass tubing, and the bottoms were drawn out to a long, sharp point. These were sterilized and plugged with cotton in the dry sterilizer. Salt solution suspensions were made according to the method used by Wright. Bacteria were killed by heat at

[a] Donaldson: Army Statistical Report, 1839.

[b] Oliver on "Danubian fever," Lancet, Vol. II, 1892, p. 1359.

[c] Veal: Report on Cases of Fever from Cyprus, Malta, and Gibraltar. Army Medical Department Reports, England, 1879.

[d] Musser: Philadelphia Medical Journal, December, 1898.

[e] Cox: Report of Surgeon-General, U. S. A., 1899, p. 285.

[f] Chamberlain: Report of Surgeon-General, U. S. A., 1900, p. 226.

[g] Curry: Report of Surgeon-General, U. S. A., 1900, p. 226. Also, Journal of Medical Research, Vol. VI, No. 1, July, 1901, pp. 241–248.

[h] Strong: Report of the Surgeon-General, U. S. A., 1900, p. 227.

[i] "Note on discussion of microorganisms in Malta fever." Practitioner, Vol XXXVI, p. 161. Also, "Observations on Malta fever." British Medical Journal, May 18, 1889.

60° C. for fifteen minutes and 0.5 per cent carbolic acid added. As a routine method one drop of blood serum was mixed with 19 drops of normal salt solution, then equal parts of this mixture with the salt suspension of the culture of the *Micrococcus melitensis*, and placed in the small tubes of the sterile pipette, making a dilution of 1–40. A reaction was called positive and complete only when, in addition to the precipitation of the bacteria in the bottom of the tube, the supernatant fluid became clear.

The method of Dr. Charles F. Craig is thus reported by him:

In performing the serum test for Malta fever I have used practically the same method as that for the Widal test. A pure culture of the micrococcus, either upon agar or in bouillon, was used. The test may be performed either with the fresh serum or with a dry drop of blood, the latter being used preferably, as it is simpler and easier to procure. A drop of blood is secured upon a glass slide and diluted with enough sterilized water to dissolve it. A graduated pipette of very small caliber is used to make the dilution with the micrococcus. Having dissolved the drop of blood, a known portion is taken from it by the pipette and placed upon a clean slide. This is then diluted with a measured quantity of the bouillon culture, or with a suspension of the agar culture made with sterilized water. The pipette is so graduated that a dilution can be made from 1–10 to 1–150. A cover glass is then placed over the mixture and this examined microscopically. In using the agar suspension the drop should be first examined, so as to be sure there is no agglutination present before the blood is added. Preferably I have used a dilution of 1–75, although the agglutination reaction has been obtained with dilution as high as 1–25, immediately. This method is easy of performance, all that is needed being the culture, the special graduated pipette, the cover glasses and slide, and the drop of blood. The method was used in all cases at the General Hospital, Presidio of San Francisco, Cal., and controls with a serum of other diseases made at the same time.

The literature relating to Malta fever among soldiers of the United States Army is very limited. The first case described was that of Dr. Musser, of Philadelphia, in the Philadelphia Medical Journal, December, 1898. His case was that of an officer who contracted the disease in Porto Rico, and he was the first to draw attention to the fact that the disease was probably endemic in that island.

In the report of the Surgeon-General of the Army for 1899 Lieut. Walter Cox, assistant surgeon, United States Army, described a case occurring in Porto Rico and observed by him. The patient was a private of the Hospital Corps, 30 years of age. He came under observation January 14, 1899. He contracted the fever in the guardhouse of an old Spanish barracks, the fever commencing January 11, 1899. He complained of pain all over the body, especially in the bones and joints. He had two chills on successive days but none afterwards. This was at the commencement of the illness. The appetite was poor and the bowels were first loose and later constipated. The temperature curve showed daily remissions and reached normal gradually. The morning temperature for a considerable time reached the normal point, but was 1°, 2°, or 3° above normal toward evening. He was discharged from the hospital on April 3, after a week of normal temperature, but was readmitted April 7, suffering again from fever. This attack was similar to the first. The blood was examined repeatedly for the malarial parasites as well as for the Widal reaction. A test with a culture of the Micrococcus melitensis showed a marked agglutination in dilution as high as 1–60. Lieutenant Chamberlain, assistant surgeon, United States Army, while on duty on the hospital ship *Relief* at Manila, P. I., observed 2 cases of the disease in soldiers, which were reported to the Surgeon-General of the Army. The men were in adjacent beds and both presented mild attacks. The temperature curve was irregular, being neither markedly remittent nor undulating. The cases were at first diagnosed as malarial fever, but the Malta fever reaction was

obtained at the laboratory of the First Reserve Hospital and both were found positive. Examination of the blood for malarial parasites and the use of the Widal test both resulted negatively. Curry and Strong in 1900 reported cases occurring at the First Reserve Hospital. Strong performed an autopsy upon a man who had died from continued fever of long duration. The post-mortem showed that it was neither typhoid nor malaria, and cultures from the case made by Curry resulted in the finding of the Micrococcus melitensis. Inoculations into monkeys produced the typical symptoms of Malta fever. While performing these experiments Strong became infected and suffered from a typical attack of the fever. In another case the condition was discovered, post-mortem and cultures were obtained of the microorganism. At this time two cases were observed in the wards of the hospital which gave the reaction with the micrococcus and were undoubtedly cases of Malta fever.

The most valuable report of Malta fever occurring in soldiers of the Army is that written by Curry and published in the Journal of Medical Research, volume 6, No. 1. In this report Curry describes the cases which came under his observation both in Manila and in the Army and Navy General Hospital at Hot Springs, Ark. Besides the 4 cases of Malta fever observed in Manila, he observed in all 8 cases of Malta fever in the hospital at Hot Springs. Four of these were described in extenso, the notes of the other 4 cases occurring in a note at the end of the report. All four of the latter cases were in a convalescent stage, the prominent symptoms being those of articular rheumatism, constipation, and frequent profuse sweatings. These cases were diagnosed as articular rheumatism. Of the four cases described more fully all gave a marked serum reaction with the *Micrococcus melitensis* when in a dilution as high as 1–300. None of the cases presented the symptoms found in the acute stage. The symptoms complained of were pains in the articulations, constipation, and sweating, and all showed anæmia. These cases were all supposed to be suffering from chronic articular rheumatism.

In his recapitulation Curry says:

We have four cases of what was thought on admission to be chronic rheumatism. These cases have not improved under treatment nor by change to this favorable climate. Neither antirheumatic nor antimalarial treatment has benefited these men. In spite of treatment and of favorable conditions repeated and more or less regular recurrence of acute rheumatic pains and swellings and of fever have taken place. These conditions have lasted a long time, for six months, the shortest, to sixteen months, the longest, of the series. The other prominent symptoms have been anæmia, profuse sweating, and constipation. The blood examinations for malarial fever and for typhoid were negative, save in the case of one who had had severe typhoid two years ago. The clinical history of these cases corresponds with that of Malta fever, and the result of the serum test with the micrococcus makes it certain that the diagnosis of Malta fever in these cases is a correct one.

Dr. Craig concludes his report as follows:

The important lesson to be learned from a study of the literature of Malta fever occurring in the United States Army is that the conditions are not easily recognized clinically, and may be attributed to typhoid, malaria, or in the chronic stages to articular rheumatism. This being so, the great value of a microscopical examination of the blood and the performance of the serum test is at once proven. None of the cases observed by me were diagnosed as Malta fever, and in only one of them was there any suspicion of the occurrence of this disease. The two cases presenting the chronic symptoms would, in all probability, have been transferred to Hot Springs, Ark., for antirheumatic treatment, while in the two cases presenting the acute symptoms the patient would probably have been treated for either typhoid fever or malaria. In

fact, in cases when, on account of finding malarial parasites at different times in the patient's blood, the treatment has been altogether that for malaria, and had a diagnosis of Malta fever been made more quickly much discomfort would probably have been saved the patient.

The following conclusions may be drawn from the study of these cases:

(1) There occurs in the Tropics a fever which may resemble in its acute stage either typhoid or malaria and in its chronic stage articular rheumatism, caused by the Micrococcus melitensis.

(2) There is no pathognomonic symptom of Malta fever. The symptoms are so inconstant and confusing that no one of them can be said to be typical of the disease.

(3) A differential diagnosis of this fever is almost impossible in the majority of cases without the aid of the microscope and the serum test.

FIRST RESERVE HOSPITAL, MANILA, P. I.

During the period July 1, 1901, to April 15, 1902, 2,999 cases were treated in this hospital, besides a large number examined and assigned elsewhere, this being the distributing hospital of Manila. Maj. William H. Arthur, surgeon, U. S. Army, was in command.

The hospital buildings, 23 in number, are much in need of repair. An allotment of $2,600 was used during the year in fitting up a pathological laboratory and receiving ward, in remodeling kitchens and offices, building a new kitchen and porch for officers' ward, bathroom and water-closets for hospital corps quarters, and a covered passageway from the surgical ward to the operating room. The addition of a small receiving and observation ward at the main entrance has been very useful. Plague, Asiatic cholera, smallpox, measles, and mumps have been detected at different times in this ward, and proper disposition made of them without exposing the other patients in a crowded ward to risk of infection. It is small, bare, and easily disinfected. The laboratory was opened February 26, 1902, and from that time to April 15, 1902, 406 examinations were made, as follows:

Blood.—One hundred and sixteen examinations, of which 77 were found positive for malarial parasites and 39 negative.

Stools.—One hundred and thirty-six examinations with results as follows: Amebæ, 37 cases; ascaris lumbricoides, 22 cases; ankylostomum duodenale, 1 case; larvæ, musca vomitoria, 1 case.

Urine.—Eighty-three examinations with results as follows: Albumen, 13 cases; sugar, 17 cases; tubercle bacilli, 1 case; gonococci, 5 cases; normal, 47 cases.

Sputum.—Thirty-six examinations for tubercle bacilli; 3 proved positive.

Pus, liver.—One examination for amebæ; result, positive.

Pus from eye.—Three examinations for gonococci, all proving positive.

Pus urethral.—One examination for gonococci; result, positive.

HOSPITAL NO. 3, MANILA, P. I.

This hospital is situated in Ermita district, just beyond the city walls and about 300 yards from the bay. It consists of 7 one-story wooden buildings having a capacity of 225 beds. The locality is good but for an estero which runs through the grounds. The average number of patients daily for the year 1901 was 172.6. From June 30, 1901, to April 15, 1902, 1,698 patients were treated. Of these, 772 were returned to duty, 25 died, 40 were discharged for disability, and 629 transferred to transports en route to the United States. The main specialty of this hospital is the reception for observation and disposition of cases which have been recommended for discharge on certificates of disability. These cases are held until the military history of each man is found to be complete and correct. In all cases, particu-

larly those of a doubtful character, repeated examinations are made by the staff of the hospital acting as a board. A small proportion of these cases recover under treatment and are returned to duty. When the board is of the opinion that the disability may not prove to be permanent, transfer to the United States for treatment is recommended. When the disability is considered permanent, the case is transferred to the General Hospital, Presidio of San Francisco, Cal., for final disposition.

A camp for hospital corps casuals is connected with this hospital. The detachment is quartered in tents which are framed and floored.

THE NOZALEDA HOSPITAL, MANILA, P. I.

This hospital was established by Maj. R. W. Johnson, surgeon, U. S. Army, December 18, 1901, on the breaking up of the Santa Mesa Hospital. Surrounding it on all sides is the most beautiful garden in the city of Manila. The front rests on Nozaleda street for 420 feet and the rear on Louban street for 320 feet. The reservation is closed in by a high stone wall on three sides, the fourth side, the front, by an ornamental iron fence. The building is a two-story brick and stone structure, the first story taken up chiefly for administrative purposes, the second used as wards. The capacity is 125 beds; but in addition to this there is in one corner of the grounds an isolated camp of 20 beds in 6 hospital tents for patients suffering from turbereulosis of the lungs.

From the time of its installation to April 15, 1902, 444 patients were admitted, 325 suffering from various forms of venereal disease, 47 from consumption, and 72 from other causes.

THE CONVALESCENT HOSPITAL, CORREGIDOR ISLAND, PHILIPPINE ISLANDS.

Corregidor Island lies across the entrance of Manila Bay, 27 miles from the city of Manila. The island is 3 miles long and from one-fourth to three-fourths of a mile wide. The greater part of it rises abruptly from the water, reaching an extreme elevation of 550 feet above the sea. Several plateaus of different sizes are formed on the higher points of the island. The hospital is situated on the shore of a small bay, on the north side of the island. It consists of four wooden pavilions elevated about 3 feet from the ground and with corrugated iron roofing. Sliding windows encircle the buildings and permit the wards to be thrown open, giving the most complete ventilation. Covered porches, 5 feet wide, extend round the buildings.

The administration building is a structure of two stories, 50 feet square, the lower story used as offices, the upper as a dormitory for the detachment of the Hospital Corps.

The kitchen, with three army ranges, and dining room are large and commodious buildings. The latter, accommodating 250 men, is the largest and most suitable building of the kind to any hospital in or near Manila.

The last-mentioned buildings are built on the general plans of the pavilions. All of the buildings are painted white, inside and out, with green trimmings, and present a very neat appearance.

Storerooms, operating rooms, and dispensary are in two adobe

buildings constructed by the Spaniards. They were rekalsomined last January, and answer in every respect the purpose for which they are used.

An ice and distilling plant is in operation, located in a building just outside the hospital grounds and formerly used as a school building. The plant is in excellent condition, having run throughout the year without a single day's stop and has greatly added to the comfort and health of the patients.

The natural drainage is perfect. Open drains run throughout the grounds, carrying the surface water to the bay. All excreta, garbage, and débris of every kind are collected daily and carried in open boats out to the sea about half a mile from the shore and dumped. This work is done by four natives hired by the quartermaster department and are under the immediate charge of an acting hospital steward. By this method the grounds are kept thoroughly policed and in good sanitary condition.

Water is supplied by piping from a dam built in a water course about three-quarters of a mile from the hospital. The dam leaks, and during the dry season the supply becomes low. This fact may in the future lead to a serious deficiency unless a larger dam is built. The erection of a proposed distilling plant would solve the problem to a great extent. During the rainy season the supply of water is abundant. Drinking water is distilled at the ice plant.

The food is very satisfactory, though recently the scarcity and high price of chickens and eggs has embarrassed the diet kitchen. Owing to the character of the hospital—a place for convalescents—practically all of the patients are on special diet. This is carefully watched, well prepared, and thoroughly enjoyed. The appetite of nearly all patients recovering from wasting disease is stimulated by the cool salt breezes, and in many cases voracious. The allowance of 40 cents is none too great; 50 cents a day could be easily used, with no wastage or extravagance.

As far as at present known, Corregidor Island is free from malaria, and such cases transferred here have done well. The water tanks, and all connections of water, however small, are covered with a layer of kerosene oil, and the few mosquitoes that would otherwise be present have disappeared. The sea air; delightfully cool breezes, almost constant; sea bathing, bright, cheerful wards, good food, and the faithful performance of their duty by the medical officers, Army Nurse Corps, and Hospital Corps, have restored to health many cases of debility, apparently chronic these good results being obtained, as a rule, rapidly, with little medical treatment.

During the period July 1, 1901, to April 15, 1902, 1,039 cases were treated in this hospital. Of these, 658 were returned to duty, 292 cases were transferred to the United States, 25 were transferred to other hospitals, 9 died, and 55 remained under treatment. Most of the cases transferred to the United States were chronic cases of amebic dysentery for which a transfer to the United States appears to offer the only promise of recovery.

STATISTICAL TABLES.

The following statistical tables give in detail the data on which the statements of this report are based. They are:

I. A numerical view of the effect of disease and injury on the Army

during the calendar year 1901, as compared with the corresponding data for 1900 and for the decade 1890–1899.

II. Numerical view of the effect of disease and injury on the United States forces doing insular and home service in 1901, as compared with corresponding data for 1900.

III. Admissions to sick report, discharges, and deaths with ratios per thousand of mean strength, 1901; also for the decade 1890–1899.

(*a*) Army. White troops. Colored troops. — Regulars and volunteers. — 1901.
(*b*) Army. White troops. Colored troops. — Regulars. — 1901.
(*c*) Army. White troops. Colored troops. — Volunteers. — 1901.
(*d*) Army. White troops. Colored troops. Indian troops. — Decade.

IV. Admissions to sick report, discharges and deaths with ratios per thousand of mean strength, 1901.

(*a*) Volunteers. Regulars. Total. — Pacific Islands and China.
(*b*) Army. — Cuba. Porto Rico.
(*c*) Army. — Total Islands and China. United States (Continental).

V. Admissions to sick report, discharges and deaths, with ratios per thousand of mean strength, 1901.

(*a*) Infantry, cavalry, artillery.
(*b*) Engineers, ordnance, Signal Corps.
(*c*) Medical Corps, others.

INTERNATIONAL TABLES.

I. Examination of recruits during the year 1901.

III. Movements of the sick by branches of military service and by months, volunteers and regulars, 1901.

VI. Admissions of important diseases by branches of the military service, volunteers and regulars, 1901.

VII. Admissions of important diseases by months, absolute numbers, volunteers and regulars, 1901.

It has not been practicable during the past year to gather data necessary for the presentation of Tables II, IV, V, and VIII of the international series.

TABLE I.—*Numerical view of the effect of disease and injury on the Army during the calendar year 1901, as compared with the corresponding data for 1900 and for the decade 1890–1899.*

	United States Army.					
	Volunteers.	Regulars.	Total.	White.	Colored.	Indian.
Mean strength, year 1901	10,606	81,885	92,491	85,357	7,134	.....
Total admissions to sick report	16,293	149,413	165,706	152,537	13,169	.....
Per 1,000 of mean strength	1,536.20	1,824.67	1,791.59	1,787.06	1,845.95	.....
Per 1,000 for previous year	2,930.01	2,029.99	2,311.81	2,352.60	1,841.67	.....
Per 1,000 for preceding decade	.....	1,502.47	1,502.47	1,505.25	1,504.20	1,115.42
Admissions for disease	15,142	132,828	147,970	136,244	11,726	.....
Per 1,000 of mean strength	1,427.68	1,622.13	1,599.82	1,596.18	1,643.67	.....
Per 1,000 for previous year	2,761.79	1,820.94	2,115.54	2,157.97	1,626.57	.....
Per 1,000 for preceding decade	.....	1,271.78	1,271.78	1,278.01	1,239.33	832.16
Admissions for injury	1,151	16,585	17,736	16,293	1,443	.....
Per 1,000 of mean strength	108.52	202.54	191.77	190.88	202.27	.....
Per 1,000 for previous year	168.23	209.05	196.27	194.63	215.10	.....
Per 1,000 for preceding decade	.....	230.69	230.69	227.24	264.87	283.28
Discharges for disability, all causes	200	1,645	1,845	1,747	98	.....
Per 1,000 of mean strength	18.86	20.09	19.95	20.47	13.74	.....
Per 1,000 for previous year	12.98	26.99	22.60	23.09	16.97	.....
Per 1,000 for preceding decade	.....	16.69	16.69	16.71	15.79	24.21
Discharges for disease	102	1,336	1,438	1,364	74	.....
Per 1,000 of mean strength	9.62	16.32	15.55	15.98	10.37	.....
Per 1,000 for previous year	10.21	21.13	17.71	18.08	13.47	.....
Per 1,000 for preceding decade	.....	13.15	13.15	13.15	12.42	21.57
Discharges for injury	98	309	407	383	24	.....
Per 1,000 of mean strength	9.24	3.77	4.40	4.49	3.36	.....
Per 1,000 for previous year	2.77	5.86	4.89	5.01	3.49	.....
Per 1,000 for preceding decade	.....	3.54	3.54	3.56	3.38	2.64
Deaths from all causes	180	1,109	1,289	1,174	115	.....
Per 1,000 of mean strength	16.97	13.54	13.94	13.75	16.12	.....
Per 1,000 for previous year	36.20	16.61	22.74	22.79	22.21	.....
Per 1,000 for preceding decade	.....	11.91	11.91	11.89	11.71	16.72
Deaths from disease	146	740	886	792	94	.....
Per 1,000 of mean strength	13.77	9.04	9.58	9.28	13.18	.....
Per 1,000 for previous year	24.94	11.62	15.79	15.86	14.97	.....
Per 1,000 for preceding decade	.....	8.49	8.49	8.54	7.77	9.68
Deaths from injury	34	369	403	382	21	.....
Per 1,000 of mean strength	3.21	4.51	4.36	4.48	2.94	.....
Per 1,000 for previous year	11.26	4.99	6.95	6.93	7.24	.....
Per 1,000 for preceding decade	.....	3.42	3.42	3.35	3.94	7.04

TABLE II.—*Numerical view of the effect of disease and injury on the United States forces doing insular and home service in 1901, as compared with corresponding data for 1900.*

	Cuba.	Porto Rico.	Pacific islands and China.			Total islands and China.			United States (continental).
			Volunteers.	Regulars.	Total.	Volunteers.	Regulars.	Total.	
Mean strength	5,297	1,153	10,606	48,920	59,526	10,606	55,370	65,976	26,515
Total admissions to sick report	8,250	1,577	16,293	98,481	114,774	16,293	108,308	124,601	41,105
Per 1,000 of mean strength	1,557.49	1,367.74	1,536.20	2,013.10	1,928.14	1,536.20	1,956.08	1,888.59	1,550.25
Per 1,000 for previous year	1,873.07	1,577.98	2,930.01	2,379.97	2,631.17	2,930.01	2,252.49	2,549.70	1,510.97
Admissions for disease	6,386	1,407	15,142	90,561	105,703	15,142	98,354	113,496	34,474
Per 1,000 of mean strength	1,205.59	1,220.30	1,427.68	1,851.21	1,775.75	1,427.68	1,776.30	1,720.26	1,300.17
Per 1,000 for previous year	1,586.19	1,397.71	2,761.79	2,220.00	2,467.43	2,761.79	2,068.75	2,342.09	1,242.87
Admissions for injury	1,864	170	1,151	7,920	9,071	1,151	9,954	11,105	6,631
Per 1,000 of mean strength	351.90	147.43	108.52	161.90	152.39	108.52	179.77	168.33	250.08
Per 1,000 for previous year	286.88	180.27	168.23	159.97	163.74	168.23	183.74	177.62	268.10
Discharges for disability, all causes	73	21	200	616	816	200	710	910	935
Per 1,000 of mean strength	13.78	18.21	18.86	12.59	13.71	18.86	12.82	13.79	35.26
Per 1,000 for previous year	16.57	15.14	12.98	23.29	18.58	12.98	21.71	18.27	39.29
Discharges for disease	58	20	102	472	574	102	550	652	786
Per 1,000 of mean strength	10.95	17.35	9.62	9.65	9.64	9.62	9.93	9.88	29.64
Per 1,000 for previous year	13.23	13.76	10.21	17.09	13.95	10.21	16.24	13.86	32.52
Discharges for injury	15	1	98	144	242	98	160	258	149
Per 1,000 of mean strength	2.83	.87	9.24	2.94	4.07	9.24	2.89	3.91	5.62
Per 1,000 for previous year	3.34	1.38	2.77	6.20	4.63	2.77	5.47	4.40	6.77
Deaths from all causes	28	9	180	889	1,069	180	926	1,106	183
Per 1,000 of mean strength	5.29	7.81	16.97	18.17	17.96	16.97	16.72	16.76	6.90
Per 1,000 for previous year	9.90	5.05	36.20	23.72	29.42	36.20	20.39	26.63	7.78
Deaths from disease	17	7	146	592	738	146	616	762	124
Per 1,000 of mean strength	3.21	6.07	13.77	12.10	12.40	13.77	11.12	11.55	4.68
Per 1,000 for previous year	8.40	5.05	24.94	16.50	20.35	24.94	14.52	18.63	4.83
Deaths from injury	11	2	34	297	331	34	310	344	59
Per 1,000 of mean strength	2.08	1.73	3.21	6.07	5.56	3.21	5.60	5.21	2.23
Per 1,000 for previous year	1.50	.....	11.26	7.22	9.07	11.26	5.86	7.99	2.96

TABLE III (*a*).—*Admissions to sick report, discharges, and deaths, with ratios per 1,000 of mean strength for 1901.*

Year 1901.	Army, Regulars and Volunteers.						White troops, Regulars and Volunteers.						Colored troops, Regulars and Volunteers.					
Mean strength	92,491						85,357						7,134					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	14	0.15					13	0.15					1	0.14				
Measles	769	8.31	5	0.05	12	0.13	753	8.82	5	0.06	12	0.14	16	2.24				
Smallpox	125	1.35			37	.40	108	1.27			26	.30	17	2.38			11	1.54
Vaccinia	2,755	29.79					2,708	31.73					47	6.59				.14
Influenza	2,608	28.20			1	.01	2,390	28.00					218	30.56			1	
Dengue	1,890	20.44			1	.01	1,792	20.99			1	.01	98	13.74				
Mumps	1,382	14.94					1,301	15.24					81	11.35				
Diphtheria	27	.29			2	.02	27	.32			1	.01					1	.14
Typhoid fever	594	6.42	5	.05	78	.84	575	6.74	5	.06	72	.84	19	2.66			6	.84
Yellow fever	14	.15			1	.01	14	.16			1	.01						
Cerebro-spinal fever	5	.05	1	.01	3	.03	5	.06	1	.01	3	.04						
Malarial fever, intermittent	29,498	318.93					26,877	314.88					2,621	367.39				
Malarial fever, remittent	4,615	49.90			7	.08	3,978	46.61			7	.08	637	89.29				
Malarial fever, pernicious	73	.79			33	.36	67	.78			31	.36	6	.84			2	.28
Malarial cachexia	994	10.75	18	.19	14	.15	941	11.02	16	.19	13	.15	53	7.43	2	0.28	1	.14
Fever, undetermined	1,805	19.52					1,669	19.55					136	19.06				
Erysipelas	69	.75			4	.04	65	.76			4	.05	4	.56				
Septicæmia and tetanus	30	.32			20	.22	29	.34			19	.22	1	.14			1	.14
Rheumatic fever	366	3.96			1	.01	318	3.73			1	.01	48	6.73				
Consumption	452	4.89	200	2.16	95	1.03	400	4.69	185	2.17	74	.87	52	7.29	15	2.10	21	2.94
Cancer	11	.12	4	.04	3	.03	10	.12	4	.05	2	.02	1	.14			1	.14
Syphilis and results	1,771	19.15	117	1.27	6	.06	1,686	19.75	112	1.31	5	.06	85	11.91	5	.70	1	.14
Gonorrhea and results	8,685	93.90	42	.45	2	.02	7,963	93.29	41	.48	2	.02	722	101.21	1	.14		
Chancroid and results	3,455	37.36	2	.02			3,093	36.24	2	.02			362	50.74				
Infectious, others	58	.63	11	.12	6	.06	51	.60	9	.11	5	.06	7	.98	2	.28	1	.14
Total infectious diseases	62,065	671.05	405	4.38	326	3.53	56,833	665.83	380	4.45	279	3.27	5,232	733.39	25	3.50	47	6.59
Anæmia	276	2.98	2	.02	3	.03	268	3.14	2	.02	3	.04	8	1.12				
Nutrition, others	94	1.02	30	.32	6	.06	92	1.08	30	.35	6	.07	2	.28				
Total diseases of nutrition	370	4.00	32	.35	9	.10	360	4.22	32	.37	9	.11	10	1.40				
Alcoholism	2,018	21.82	10	.11	26	.28	1,952	22.87	10	.12	26	.30	66	9.25				
Brain and spinal cord	287	3.10	71	.77	6	.06	265	3.10	70	.82	6	.07	22	3.08	1	.14		
Insanity	166	1.79	142	1.53			156	1.83	129	1.51			10	1.40	13	1.82		

Meningitis	15	.16	3	.03	6	.06	13	.15	2	.02	5	.06	2	.28	1	.14	1	.14
Poisoning, narcotic	108	1.17	7	.08	7	.08	106	1.24	7	.08	7	.08	2	.28				
Nervous system, others	2,206	23.85	38	.41	1	.01	1,932	22.63	37	.43			274	3.84	1	.14	1	.14
Total diseases of the nervous system	4,800	51.90	271	2.93	46	.50	4,424	51.83	255	2.99	44	.52	376	5.27	16	2.24	2	.28
Poisoning, irritant	346	3.74	1	.01	4	.04	335	3.92	1	.01	4	.05	11	1.54				
Tonsillitis, pharyngitis, and sore throat	4,018	43.44					3,835	44.93					183	25.65				
Peritonitis	13	.14	1	.01	13	.14	12	.14	1	.01	12	.14	1	.14			1	.14
Dyspepsia, colic, and constipation	6,833	73.88	3	.03			6,155	72.11	2	.02			678	95.03	1	.14		
Gastritis	3,562	38.51	6	.06	4	.04	3,286	38.50	6	.07	4	.05	276	38.69				
Dysentery, acute	4,203	45.47			115	1.24	3,830	44.87			101	1.18	373	52.28			14	1.96
Dysentery, chronic	2,391	25.83	53	.57	171	1.85	2,308	27.04	50	.59	159	1.86	83	11.63	3	.42	12	1.68
Diarrheal diseases, others	20,303	219.51	9	.10	19	.21	18,708	219.17	9	.11	16	.19	1,595	223.58			3	.42
Enteritis	1,756	18.99	3	.03	17	.18	1,669	19.55	3	.04	16	.19	87	12.19			1	.14
Perityphlitis and appendicitis	265	2.87	5	.05	15	.16	257	3.01	5	.06	13	.15	8	1.12			2	.28
Digestive system, others	3,514	37.99	48	.52	24	.26	3,258	38.17	47	.55	22	.26	256	35.88	1	.14	2	.28
Total diseases of the digestive system	47,204	510.35	129	1.39	382	4.13	43,653	511.41	124	1.45	347	4.07	3,551	497.75	5	.70	35	4.91
Heart, diseases of	568	6.14	129	1.39	25	.27	536	6.28	121	1.42	23	.27	32	4.49	8	1.12	2	.28
Arteries and veins	144	1.56	26	.28	6	.06	141	1.65	26	.30	4	.05	3	.42			2	.28
Total diseases of the circulatory system	712	7.70	155	1.68	31	.34	677	7.93	147	1.72	27	.32	35	4.91	8	1.12	4	.56
Bronchitis	4,618	49.93	5	.05			1,278	50.12	5	.06			340	47.66				
Pneumonia	343	3.71	3	.03	53	.57	318	3.73	3	.04	50	.59	25	3.50			3	.42
Pleurisy	299	3.23	5	.05	1	.01	278	3.26	5	.06	1	.01	21	2.94				
Respiratory system, others	2,100	22.71	15	.16	1	.01	2,006	23.50	14	.16	1	.01	94	13.18	1	.14		
Total diseases of the respiratory system	7,360	79.58	28	.30	55	.59	6,880	80.60	27	.32	52	.61	480	67.28	1	.14	3	.42
Kidneys, diseases of	350	3.78	21	.23	34	.37	316	3.70	20	.23	32	.37	34	4.77	1	.14	2	.28
Varicocele	381	4.12	7	.08			373	4.37	7	.08			8	1.12				
Genito-urinary, others	1,178	12.74	20	.22	1	.01	1,112	13.03	17	.20			66	9.25	3	.42	1	.14
Total diseases of the genito-urinary system	1,909	20.64	48	.52	35	.38	1,801	21.10	44	.52	32	.37	108	15.14	4	.56	3	.42
Adenitis	584	6.31	1	.01			542	6.35	1	.01			42	5.89				
Lymphatic system, others	116	1.25	2	.02			110	1.29	2	.02			6	.84				
Total diseases of the lymphatic system	700	7.57	3	.03			652	7.64	3	.03			48	6.73				
Rheumatism, muscular	3,396	36.72	16	.17			3,054	35.78	16	.19			342	47.94				
Osteitis and periostitis	161	1.74	6	.06	1	.01	158	1.85	6	.07	1	.01	3	.42				
Arthritis and synovitis	697	7.54	35	.38			607	7.11	34	.40			90	12.61	1	.14		
Rheumatism, chronic articular	747	8.08	30	.32			707	8.28	29	.34			40	5.61	1	.14		
Muscles, bones, and joints, others	456	4.90	62	.67			419	4.91	55	.64			34	4.77	7	.98		
Total diseases of the muscles, bones, and joints	5,454	58.97	149	1.61	1	.01	4,945	57.93	140	1.64	1	.01	509	71.35	9	1.26		

TABLE III (*a*).—*Admissions to sick report, discharges, and deaths, with ratios per 1,000 of mean strength for 1901*—Continued.

Year 1901.	Army, Regulars and Volunteers.						White troops, Regulars and Volunteers.						Colored troops, Regulars and Volunteers.					
Mean strength	92,491						85,357						7,134					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Total diseases of the integumentary system	14,191	153.44	8	0.09	1	0.01	13,022	152.56	8	0.09	1	0.01	1,169	163.88	.....	.....	.....	.....
Total diseases of the eye	1,420	15.35	92	.99	.....	.....	1,295	15.17	87	1.02	.....	.....	125	17.52	5	0.70	.....	.....
Total diseases of the ear	1,404	15.18	115	1.24	.....	.....	1,344	15.75	114	1.34	.....	.....	60	8.41	1	.14	.....	.....
Total diseases of the nose	147	1.59	3	.03	.....	.....	134	1.57	3	.04	.....	.....	13	1.82	.....	.....	.....	.....
Total unclassified and undiagnosed	234	2.53	.....	.....	.....	.....	224	2.62	.....	.....	.....	.....	10	1.40	.....	.....	.....	.....
Total for diseases	147,970	1,599.82	1,438	15.55	886	9.58	136,244	1,596.18	1,364	15.98	792	9.28	11,726	1,643.67	74	10 37	94	13.18
Drowning	.....	.....	.....	.....	113	1.22	.....	.....	.....	.....	101	1.18	.....	.....	.....	.....	12	1.68
Exhaustion from exposure and fatigue	370	4.00	.....	.....	1	.01	339	3.97	.....	.....	1	.01	31	4.35	.....	.....	.....	.....
Heat stroke	207	2.24	5	.05	9	.10	203	2.38	5	.06	9	.09	4	.56	.....	.....	.....	.....
Lightning stroke	1	.01	.....	.....	.....	.....	1	.01	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Venomous bites, stings, and wounds	573	6.20	2	.02	.....	.....	531	6.22	1	.01	.....	.....	42	5.89	1	.14	.....	.....
Abrasions, blisters, burns, and scalds	1,949	21.07	2	.02	1	.01	1,819	21.31	2	.02	1	.01	130	18.22	.....	.....	.....	.....
Compression and concussion of brain	50	.54	1	.01	5	.05	44	.52	1	.01	5	.06	6	.84	.....	.....	.....	.....
Contusions and sprains	7,953	85.99	3	.03	.....	.....	7,305	85.59	3	.04	.....	.....	648	90.83	.....	.....	.....	.....
Dislocations	279	3.02	6	.06	.....	.....	264	3.09	6	.07	.....	.....	15	2.10	.....	.....	.....	.....
Fractures (not shot)	748	8.09	48	.52	22	.24	706	8.27	41	.48	22	.26	42	5.89	7	.98	.....	.....
Hernia	404	4.37	86	.93	.....	.....	370	4.33	84	.98	.....	.....	34	4.77	2	.28	.....	.....
Wounds, contused, lacerated, and punctured	2,168	23.44	8	.09	4	.04	1,976	23.15	7	.08	3	.04	192	26.91	1	.14	1	.14
Wounds, incised	1,220	13.19	10	.11	85	.92	1,112	13.03	10	.12	83	.97	108	15.14	.....	.....	2	.28
Wounds, gunshot	475	5.14	183	1.98	146	1.58	431	5.05	173	2.03	140	1.64	44	6.17	10	1.40	6	.84
Secondary, results of injury	279	3.02	40	.43	.....	.....	272	3.19	38	.45	.....	.....	7	.98	2	.28	.....	.....
Other injuries	1,060	11.46	13	.14	17	.18	920	10.78	12	.14	17	.20	140	19.62	1	.14	.....	.....
Total for injuries	17,736	191.77	407	4.40	403	4.36	16,293	190.88	383	4.49	382	4.48	1,443	202.27	24	3.36	21	2.94
Total for diseases and injuries	165,706	1,791.59	1,845	19.95	1,289	13.94	152,537	1,787.06	1,747	20.47	1,174	13.75	13,169	1,845.95	98	13.74	115	16.12

TABLE III (*b*).—*Admissions to sick report, discharges, and deaths, with ratios per 1,000 of mean strength for 1901.*

Year 1901.	Regular Army.						White troops, regulars.						Colored troops, regulars.					
Mean strength	81,885.						75,984.						5,901.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	14	0.17					13	0.17					1	0.17				
Measles	700	8.55	5	0.06	11	0.13	688	9.05	5	0.07	11	0.14	12	2.03				
Smallpox	113	1.38			32	.39	98	1.29			22	.29	15	2.54			10	1.69
Vaccinia	2,721	33.23					2,678	35.24					43	7.29				
Influenza	2,563	31.30			1	.01	2,354	30.98					209	35.42			1	.17
Dengue	1,736	21.20			1	.01	1,673	22.02			1	.01	63	10.68				
Mumps	1,318	16.10					1,241	16.33					77	13.05				
Diphtheria	25	.31			2	.02	25	.33			1	.01					1	.17
Typhoid fever	552	6.74	5	.06	72	.88	533	7.01	5	.07	66	.87	19	3.22			6	1.02
Yellow fever	14	.17			1	.01	14	.18			1	.01						
Cerebro-spinal fever	4	.05	1	.01	2	.02	4	.05	1	.01	2	.03						
Malarial fever, intermittent	25,147	307.10					23,235	305.79					1,912	324.02				
Malarial fever, remittent	3,926	47.95			6	.07	3,320	43.69			6	.08	606	102.71				
Malarial fever, pernicious	63	.77			28	.34	59	.78			27	.36	4	.68			1	.17
Malarial cachexia	784	9.58	17	.21	12	.15	747	9.83	15	.20	11	.14	37	6.27	2	.34	1	.17
Fever, undetermined	1,588	19.40					1,484	19.53					104	17.63				
Erysipelas	63	.77			3	.04	59	.78			3	.04	4	.68				
Septicæmia and tetanus	28	.34			19	.23	27	.36			18	.24	1	.17			1	.17
Rheumatic fever	341	4.16			1	.01	298	3.92			1	.01	43	7.29				
Consumption	414	5.06	191	2.33	78	.95	372	4.90	177	2.33	62	.82	42	7.12	14	2.37	16	2.71
Cancer	11	.13	4	.05	3	.04	10	.13	4	.05	2	.03	1	.17			1	.17
Syphilis and results	1,669	20.38	117	1.43	5	.06	1,594	20.98	112	1.47	4	.05	75	12.71	5	.85	1	.17
Gonorrhœa and results	8,126	99.25	41	.50	2	.02	7,436	97.86	40	.53	2	.03	690	116.94	1	.17		
Chancroid and results	3,044	37.18	2	.02			2,699	35.52	2	.03			345	58.48				
Infectious, others	48	.59	10	.12	5	.06	42	.55	8	.11	4	.05	6	1.02	2	.34	1	.17
Total infectious diseases	55,012	671.83	393	4.80	284	3.47	50,703	667.29	369	4.86	244	3.21	4,309	730.22	24	4.07	40	6.78
Anæmia	255	3.11	2	.02	1	.01	249	3.28	2	.03	1	.01	6	1.02				
Nutrition, others	90	1.10	29	.35	5	.06	88	1.16	29	.38	5	.07	2	.34				
Total diseases of nutrition	345	4.21	31	.38	6	.07	337	4.43	31	.41	6	.08	8	1.36				
Alcoholism	1,949	23.80	10	.12	26	.32	1,888	24.85	10	.13	26	.34	61	10.34				
Brain and spinal cord	266	3.25	66	.81	4	.05	247	3.25	65	.86	4	.05	19	3.22	1	.17		

TABLE III (*b*).—*Admissions to sick report, discharges, and deaths, with ratios per 1,000 of mean strength for 1901*—Continued.

Year 1901.	Regular Army.						White troops, regulars.						Colored troops, regulars.					
Mean strength	81,885.						75,984.						5,901.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Insanity	146	1.78	115	1.40	.....	.....	138	1.82	105	1.38	.....	.....	8	1.36	10	1.69	.....	.....
Meningitis	13	.16	3	.04	5	0.06	12	.16	2	.03	5	0.07	1	.17	1	.17	.....	.....
Poisoning, narcotic	98	1.20	7	.09	7	.09	96	1.26	7	.09	7	.09	2	.34	.....	.....	.....	.....
Nervous system, others	2,001	24.44	38	.46	1	.01	1,766	23.24	37	.49	.....	.....	235	39.83	1	.17	1	0.17
Total diseases of the nervous system	4,473	54.63	239	2.92	43	.53	4,147	54.58	226	2.97	42	.55	326	55.25	13	2.20	1	.17
Poisoning, irritant	343	4.19	1	.01	4	.05	332	4.37	1	.01	4	.05	11	1.86	.....	.....	.....	.....
Tonsillitis, pharyngitis, and sore throat	3,840	46.90	.....	.....	.....	.....	3,663	48.21	.....	.....	.....	.....	177	30.00	.....	.....	.....	.....
Peritonitis	11	.13	1	.01	12	.15	10	.13	1	.01	11	.14	1	.17	.....	.....	1	.17
Dyspepsia, colic, and constipation	6,222	75.99	3	.04	.....	.....	5,685	74.81	2	.03	.....	.....	537	91.02	1	.17	.....	.....
Gastritis	3,244	39.62	6	.07	4	.05	3,005	39.55	6	.08	4	.05	239	40.51	.....	.....	.....	.....
Dysentery, acute	3,735	45.62	.....	.....	100	1.22	3,399	44.73	.....	.....	89	1.17	336	56.95	.....	.....	11	1.86
Dysentery, chronic	2,177	26.59	53	.65	126	1.54	2,101	27.65	50	.66	117	1.54	76	12.88	3	.51	9	1.53
Diarrheal diseases, others	18,023	220.10	9	.11	14	.17	16,609	218.59	9	.12	11	.14	1,414	239.63	.....	.....	3	.51
Enteritis	1,650	20.15	3	.04	12	.15	1,570	20.66	3	.04	12	.16	80	13.56	.....	.....	.....	.....
Perityphlitis and appendicitis	245	2.99	5	.06	14	.17	238	3.13	5	.07	13	.17	7	1.19	.....	.....	1	.17
Digestive system, others	3,212	39.23	48	.59	22	.27	2,994	39.40	47	.62	20	.26	218	36.95	1	.17	2	.34
Total diseases of the digestive system	42,702	521.49	129	1.58	308	3.76	39,606	521.24	124	1.63	281	3.70	3,096	524.66	5	.85	27	4.58
Heart, diseases of	542	6.62	127	1.55	20	.24	512	6.74	119	1.57	18	.24	30	5.08	8	1.36	2	.34
Arteries and veins	130	1.59	24	.29	5	.06	127	1.67	24	.32	3	.04	3	.51	.....	.....	2	.34
Total diseases of the circulatory system	672	8.21	151	1.84	25	.31	639	8.41	143	1.88	21	.28	33	5.59	8	1.36	4	.68
Bronchitis	4,244	51.83	5	.06	.....	.....	3,927	51.68	5	.07	.....	.....	317	53.72	.....	.....	.....	.....
Pneumonia	288	3.52	3	.04	39	.48	269	3.54	3	.04	37	.49	19	3.22	.....	.....	2	.34
Pleurisy	267	3.26	5	.06	1	.01	253	3.33	5	.07	1	.01	14	2.37	.....	.....	.....	.....
Respiratory system, others	1,937	23.66	15	.18	1	.01	1,865	24.54	14	.18	1	.01	72	12.20	1	.17	.....	.....
Total diseases of the respiratory system	6,736	82.26	28	.34	41	.50	6,314	83.09	27	.36	39	.51	422	71.51	1	.17	2	.34

Kidneys, diseases of	313	3.82	18	.22	30	.37	289	3.80	17	.22	28	.37	24	4.07	1	.17	2	.34
Varicocele	339	4.14	7	.09	.....	.....	332	4.37	7	.09	.....	.....	7	1.19	.....	.....	.....	.....
Genito-urinary, others	1,056	12.90	20	.24	1	.01	995	13.09	17	.22	.....	.....	61	10.34	3	.51	1	.17
Total diseases of the genito-urinary system	1,708	20.86	45	.55	31	.38	1,616	21.27	41	.54	28	.37	92	15.59	4	.68	3	.51
Adenitis	513	6.27	1	.01	.....	.....	477	6.28	1	.01	.....	.....	36	6.10	.....	.....	.....	.....
Lymphatic system, others	104	1.27	2	.02	.....	.....	99	1.30	2	.03	.....	.....	5	.85	.....	.....	.....	.....
Total diseases of the lymphatic system	617	7.54	3	.04	.....	.....	576	7.58	3	.04	.....	.....	41	6.95	.....	.....	.....	.....
Rheumatism, muscular	3,151	38.48	16	.20	.....	.....	2,849	37.49	16	.21	.....	.....	302	51.18	.....	.....	.....	.....
Osteitis and periostitis	148	1.81	5	.06	1	.01	146	1.92	5	.07	1	.01	2	.34	.....	.....	.....	.....
Arthritis and synovitis	586	7.16	32	.39	.....	.....	508	6.69	31	.41	.....	.....	78	13.22	1	.17	.....	.....
Rheumatism, chronic articular	718	8.77	29	.35	.....	.....	680	8.95	28	.37	.....	.....	38	6.44	1	.17	.....	.....
Muscles, bones, and joints, others	412	5.03	54	.66	.....	.....	383	5.04	48	.63	.....	.....	29	4.91	6	1.02	.....	.....
Total diseases of the muscles, bones, and joints	5,015	61.25	136	1.66	1	.01	4,566	60.09	128	1.68	1	.01	449	76.10	8	1.36	.....	.....
Total diseases of the integumentary system	12,659	154.60	7	.09	1	.01	11,602	152.69	7	.09	1	.01	1,057	179.12	.....	.....	.....	.....
Total diseases of the eye	1,307	15.96	85	1.04	.....	.....	1,193	15.70	80	1.05	.....	.....	114	19.32	5	.85	.....	.....
Total diseases of the ear	1,305	15.94	86	1.05	.....	.....	1,248	16.42	85	1.12	.....	.....	57	9.66	1	.17	.....	.....
Total diseases of the nose	143	1.75	3	.04	.....	.....	130	1.71	3	.04	.....	.....	13	2.20	.....	.....	.....	.....
Total unclassified and undiagnosed	134	1.64	.....	.....	.....	.....	125	1.64	.....	.....	.....	.....	9	1.53	.....	.....	.....	.....
Total for diseases	132,828	1,622.13	1,336	16.32	740	9.04	122,802	1,616.16	1,267	16.67	663	8.72	10,026	1,699.04	69	11.69	77	13.05
Drowning	.....	.....	.....	.....	104	1.27	.....	.....	.....	.....	92	1.21	.....	.....	.....	.....	12	2.03
Exhaustion from exposure and fatigue	336	4.10	.....	.....	1	.01	310	4.08	.....	.....	1	.01	26	4.41	.....	.....	.....	.....
Heat stroke	202	2.47	5	.06	9	.11	199	2.62	5	.07	9	.12	3	.51	.....	.....	.....	.....
Lightning stroke	1	.01	.....	.....	.....	.....	1	.01	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Venomous bites, stings, and wounds	499	6.09	2	.02	.....	.....	459	6.04	1	.01	.....	.....	40	6.78	1	.17	.....	.....
Abrasions, blisters, burns, and scalds	1,755	21.43	.....	.....	1	.01	1,633	21.49	.....	.....	1	.01	122	20.67	.....	.....	.....	.....
Compression and concussion of brain	47	.57	1	.01	5	.06	42	.55	1	.01	5	.07	5	.85	.....	.....	.....	.....
Contusions and sprains	7,548	92.18	3	.04	.....	.....	6,935	91.27	3	.04	.....	.....	613	103.88	.....	.....	.....	.....
Dislocations	256	3.13	6	.07	.....	.....	243	3.20	6	.08	.....	.....	13	2.20	.....	.....	.....	.....
Fractures (not shot)	706	8.62	43	.53	22	.27	666	8.76	36	.47	22	.29	40	6.78	7	1.19	.....	.....
Hernia	359	4.38	79	.96	.....	.....	332	4.37	77	1.01	.....	.....	27	4.58	2	.34	.....	.....
Wounds, contused, lacerated, and punctured	2,056	25.11	8	.10	4	.05	1,885	24.81	7	.09	3	.04	171	28.98	1	.17	1	.17
Wounds, incised	1,121	13.69	6	.07	81	.99	1,026	13.50	6	.08	79	1.04	95	16.10	.....	.....	2	.34
Wounds, gunshot	418	5.10	108	1.32	125	1.53	381	5.01	100	1.32	120	1.58	37	6.27	8	1.36	5	.85
Secondary, results of injury	260	3.18	35	.43	.....	.....	254	3.34	35	.46	.....	.....	6	1.02	.....	.....	.....	.....
Other injuries	1,021	12.47	13	.16	17	.21	882	11.61	12	.16	17	.22	139	23.55	1	.17	.....	.....
Total for injuries	16,586	202.54	309	3.77	369	4.51	15,248	200.67	289	3.80	349	4.59	1,337	226.57	20	3.39	20	3.39
Total for diseases and injuries	149,413	1,824.67	1,645	20.09	1,109	13.54	138,050	1,816.83	1,556	20.48	1,012	13.32	11,363	1,925.61	89	15.08	97	16.44

TABLE III (*c*).—*Admissions to sick report, discharges, and deaths, with ratios per 1,000 of mean strength for 1901.*

Year 1901.	Volunteer Army.						White troops, volunteers.						Colored troops, volunteers.					
Mean strength	10,606.						9,373.						1,233.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Measles	69	6.51			1	0.09	65	6.93			1	0.11	4	3.24				
Smallpox	12	1.13			5	.47	10	1.07			4	.43	2	1.62			1	0.81
Vaccinia	34	3.21					30	3.20					4	3.24				
Influenza	45	4.24					36	3.84					9	7.30				
Dengue	154	14.52					119	12.69					35	28.39				
Mumps	64	6.03					60	6.40					4	3.24				
Diphtheria	2	.19					2	.21										
Typhoid fever	42	3.96			6	.57	42	1.48			6	.64						
Cerebro-spinal fever	1	.09			1	.09	1	.11			1	.11						
Malarial fever, intermittent	4,351	410.24					3,642	388.56					709	575.02				
Malarial fever, remittent	689	64.96			1	.09	658	70.20			1	.11	31	25.14				
Malarial fever, pernicious	10	.94			5	.47	8	.85			4	.43	2	1.62			1	.81
Malarial cachexia	210	19.80	1	0.09	2	.19	194	20.70	1	0.11	2	.21	16	12.98				
Fever, undetermined	217	20.46					185	19.74					32	25.95				
Erysipelas	6	.57			1	.09	6	.64			1	.11						
Septicæmia and tetanus	2	.19			1	.09	2	.21			1	.11						
Rheumatic fever	25	2.36					20	2.13					5	4.06				
Consumption	38	3.58	9	.85	17	1.60	28	2.99	8	.85	12	1.28	10	8.11	1	0.81	5	4.06
Syphilis and results	102	9.62			1	.09	92	9.81			1	.11	10	8.11				
Gonorrhœa and results	559	52.70	1	.09			527	56.22	1	.11			32	25.95				
Chancroid and results	411	38.75					394	42.04					17	13.79				
Infectious, others	10	.94	1	.09	1	.09	9	.96	1	.11	1	.11	1	.81				
Total infectious diseases	7,053	665.00	12	1.13	42	3.96	6,130	654.01	11	1.17	35	3.73	923	748.58	1	.81	7	5.68
Anæmia	21	1.98			2	.19	19	2.03			2	.21	2	1.62				
Nutrition, others	4	.38	1	.09	1	.09	4	.43	1	.11	1	.11						
Total diseases of nutrition	25	2.36	1	.09	3	.28	23	2.45	1	.11	3	.32	2	1.62				
Alcoholism	69	6.51					64	6.83					5	4.06				
Brain and spinal cord	21	1.98	5	.47	2	.19	18	1.92	5	.53	2	.21	3	2.43				
Insanity	20	1.89	27	2.55			18	1.92	24	2.56			2	1.62	3	2.43		
Meningitis	2	.19			1	.09	1	.11					1	.81			1	.81

Poisoning, narcotic	10	.94					10	1.07										
Nervous system, others	205	19.33					166	17.71					39	31.63				
Total diseases of the nervous system	327	30.83	32	3.02	3	.28	277	29.55	29	3.09	2	.21	50	40.55	3	2.43	1	.81
Poisoning, irritant	3	.28					3	.32										
Tonsillitis, pharyngitis, and sore throat	178	16.78					172	18.35					6	4.87				
Peritonitis	2	.19			1	.09	2	.21			1	.11						
Dyspepsia, colic, and constipation	611	57.61					470	50.14					141	114.36				
Gastritis	318	29.98					281	29.98					37	30.01				
Dysentery, acute	168	14.13			15	1.41	431	45.98			12	1.28	37	30.01			3	2.43
Dysentery, chronic	214	20.18			45	4.24	207	22.08			42	4.48	7	5.68			3	2.43
Diarrheal diseases, others	2,280	214.97			5	.47	2,099	223.94			5	.53	181	146.80				
Enteritis	106	9.99			5	.47	99	10.56			4	.43	7	5.68			1	.81
Perityphlitis and appendicitis	20	1.89			1	.09	19	2.03					1	.81			1	.81
Digestive system, others	302	28.47			2	.19	264	28.17			2	.21	38	30.82				
Total diseases of the digestive system	4,502	424.48			74	6.98	4,047	431.77			66	7.04	455	369.02			8	6.49
Heart, diseases of	26	2.45	2	.19	5	.47	24	2.56	2	.21	5	.53	2	1.62				
Arteries and veins	14	1.32	2	.19	1	.09	14	1.49	2	.21	1	.11						
Total diseases of the circulatory system	40	3.77	4	.38	6	.57	38	4.05	4	.43	6	.64	2	1.62				
Bronchitis	374	35.26					351	37.45					23	18.65				
Pneumonia	55	5.19			14	1.32	49	5.23			13	1.39	6	4.87			1	.81
Pleurisy	32	3.02					25	2.67					7	5.68				
Respiratory system, others	163	15.37					141	15.04					22	17.84				
Total diseases of the respiratory system	624	58.83			14	1.32	566	60.39			13	1.39	58	47.04			1	.81
Kidneys, diseases of	37	3.49	3	.28	4	.38	27	2.88	3	.32	4	.43	10	8.11				
Varicocele	42	3.96					41	4.37					1	.81				
Genito-urinary, others	122	11.50					117	12.48					5	4.06				
Total diseases of the genito-urinary system	201	18.95	3	.28	4	.38	185	19.74	3	.32	4	.43	16	12.98				
Adenitis	71	6.69					65	6.93					6	4.87				
Lymphatic system, others	12	1.13					11	1.17					1	.81				
Total diseases of the lymphatic system	83	7.83					76	8.11					7	5.68				
Rheumatism, muscular	245	23.10					205	21.87					40	32.44				
Osteitis and periostitis	13	1.23	1	.09			12	1.28	1	.11			1	.81				
Arthritis and synovitis	111	10.46	3	.28			99	10.56	3	.32			12	9.73				
Rheumatism, chronic articular	29	2.73	1	.09			27	2.88	1	.11			2	1.62				
Muscles, bones, and joints, others	41	3.87	8	.75			36	3.84	7	.75			5	4.06	1	.81		
Total diseases of the muscles, bones, and joints	439	41.39	13	1.23			379	40.43	12	1.28			60	48.66	1	.81		

TABLE III (*c*).—*Admissions to sick report, discharges, and deaths, with ratios per 1,000 of mean strength for 1901*—Continued.

Year 1901.	Volunteer Army.						White troops, volunteers.						Colored troops, volunteers.					
Mean strength	10,606.						9,373.						1,233.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Total diseases of the integumentary system	1,532	144.44	1	0.09	.....	.....	1,420	151.50	1	0.11	.....	.....	112	90.84	.....	.....	.....	.....
Total diseases of the eye	113	10.65	7	.66	.....	.....	102	10.88	7	.75	.....	.....	11	8.92	.....	.....	.....	.....
Total diseases of the ear	99	9.33	29	2.73	.....	.....	96	10.24	29	3.09	.....	.....	3	2.43	.....	.....	.....	.....
Total diseases of the nose	4	.38	.....	.....	.....	.....	4	.43	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total unclassified and undiagnosed	100	9.43	.....	.....	.....	.....	99	10.56	.....	.....	.....	.....	1	.81	.....	.....	.....	.....
Total for diseases	15,142	1,427.68	102	9.62	146	13.77	13,442	1,434.12	97	10.35	129	13.76	1,700	1,378.75	5	4.06	17	13.79
Drowning	.....	.....	.....	.....	9	.85	.....	.....	.....	.....	9	.96	.....	.....	.....	.....	.....	.....
Exhaustion from exposure and fatigue	34	3.21	.....	.....	.....	.....	29	3.09	.....	.....	.....	.....	5	4.06	.....	.....	.....	.....
Heat stroke	5	.47	.....	.....	.....	.....	4	.43	.....	.....	.....	.....	1	.81	.....	.....	.....	.....
Venomous bites, stings, and wounds	74	6.98	.....	.....	.....	.....	72	7.68	.....	.....	.....	.....	2	1.62	.....	.....	.....	.....
Abrasions, blisters, burns, and scalds	194	18.29	2	.19	.....	.....	186	19.84	2	.21	.....	.....	8	6.49	.....	.....	.....	.....
Compression and concussion of brain	3	.28	.....	.....	.....	.....	2	.21	.....	.....	.....	.....	1	.81	.....	.....	.....	.....
Contusions and sprains	405	38.19	.....	.....	.....	.....	370	39.47	.....	.....	.....	.....	35	28.39	.....	.....	.....	.....
Dislocations	23	2.17	.....	.....	.....	.....	21	2.24	.....	.....	.....	.....	2	1.62	.....	.....	.....	.....
Fractures (not shot)	42	3.96	5	.47	.....	.....	40	4.27	5	.53	.....	.....	2	1.62	.....	.....	.....	.....
Hernia	45	4.24	7	.66	.....	.....	38	4.05	7	.75	.....	.....	7	5.68	.....	.....	.....	.....
Wounds, contused, lacerated, and punctured	112	10.56	.....	.....	.....	.....	91	9.71	.....	.....	.....	.....	21	17.03	.....	.....	.....	.....
Wounds, incised	99	9.33	4	.38	4	.38	86	9.17	4	.43	4	.43	13	10.54	.....	.....	.....	.....
Wounds, gunshot	57	5.37	75	7.07	21	1.98	50	5.33	73	7.79	20	2.13	7	5.68	2	1.62	1	.81
Secondary, results of injury	19	1.79	5	.47	.....	.....	18	1.92	3	.32	.....	.....	1	.81	2	1.62	.....	.....
Other injuries	39	3.68	.....	.....	.....	.....	38	4.05	.....	.....	.....	.....	1	.81	.....	.....	.....	.....
Total for injuries	1,151	108.52	98	9.24	34	3.21	1,045	111.49	94	10.03	33	3.52	106	85.97	4	3.24	1	.81
Total for diseases and injuries	16,293	1,536.20	200	18.86	180	16.97	14,487	1,545.61	191	20.38	162	17.28	1,806	1,464.72	9	7.30	18	14.60

TABLE III *d*).—*Admissions to sick report, discharges, and deaths, with ratios per 1,000 of mean strength, for the decade 1890–1899.*

Decade 1890–1899	United States Army.						White troops.					
Mean strength	32,830						29,938					
Cause of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	58	0.18			3	0.01	57	0.19			3	0.01
Measles	3,903	11.89	3	0.01	40	.12	3,780	12.63	3	0.01	40	.13
Smallpox	169	.51			34	.10	154	.51			34	.11
Vaccinia	13,404	40.82	2	.01			12,301	41.09	2	.01		
Influenza	19,778	60.24	1	.003	48	.15	17,560	58.66	1	.003	44	.15
Dengue	2,050	6.24					1,966	6.57				
Mumps	2,379	7.25					2,101	7.02				
Diphtheria	183	.56			6	.02	162	.54			6	.02
Typhoid fever	6,727	20.49	33	.10	751	2.29	6,544	21.86	33	.11	716	2.39
Yellow fever	868	2.64			126	.38	663	2.21			100	.33
Cerebro spinal fever	96	.29	10	.03	52	.16	90	.30	10	.03	46	.15
Malarial fever, intermittent	63,630	193.82			9	.03	59,118	197.47			9	.03
Malarial fever, remittent	20,817	63.41	5	.02	81	.26	19,867	66.36	5	.02	73	.24
Malarial fever, pernicious	379	1.15			109	.33	354	1.18			95	.32
Malarial cachexia	4,063	12.38	120	.37	16	.05	3,537	11.81	118	.39	14	.05
Fever, undetermined	5,598	17.05					5,297	17.70				
Erysipelas	421	1.28			14	.04	382	1.28			10	.03
Septicæmia and tetanus	34	.10	1	.003	18	.05	33	.11	1	.003	17	.06
Rheumatic fever	1,833	5.58	21	.06	5	.02	1,650	5.51	16	.05	5	.02
Consumption	996	3.03	517	1.57	168	.51	854	2.85	448	1.50	133	.44
Cancer	74	.23	12	.04	32	.10	69	.23	11	.04	30	.10
Syphilis and results	4,159	12.67	378	1.15	9	.03	3,702	12.37	330	1.10	8	.03
Gonorrhœa and results	18,254	55.60	77	.23	1	.003	16,518	55.17	72	.24	1	.003
Chancroid and results	5,836	17.78	12	.04			5,187	17.29	11	.04		
Infectious, others	741	2.26	21	.06	21	.06	651	2.17	18	.06	19	.06
Total infectious diseases	176,450	537.46	1,213	3.69	1,546	4.71	162,597	543.12	1,079	3.60	1,403	4.69
Anæmia	650	1.98	22	.07	6	.02	633	2.11	20	.07	6	.02
Nutrition, others	312	.95	89	.27	12	.04	287	.96	78	.26	11	.04
Total diseases of nutrition	962	2.93	111	.34	18	.05	920	3.07	98	.33	17	.06
Alcoholism	8,572	26.11	9	.03	78	.24	8,413	28.11	9	.03	77	.26
Brain and spinal cord	2,037	6.20	234	.71	84	.26	1,820	6.08	220	.73	77	.26
Insanity	447	1.36	336	1.02	8	.02	423	1.41	318	1.06	7	.02

TABLE III (*d*).—*Admissions to sick report, discharges, and deaths, with ratios per 1,000 of mean strength, for the decade 1890–1899*—Continued.

Decade 1890–1899	United States Army.						White troops.					
Mean strength	32,830						29,938					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Cause of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Meningitis	37	0.11	3	0.01	16	0.05	35	0.12	3	0.01	14	0.05
Poisoning, narcotic	153	.47	14	.04	28	.08	146	.49	13	.04	27	.09
Nervous system, others	9,699	29.54	194	.59	13	.04	8,481	28.33	185	.62	11	.04
Total diseases of the nervous system	20,945	63.80	790	2.41	227	.69	19,318	64.53	748	2.50	213	.71
Poisoning, irritant	323	.98	.....	.....	48	.15	307	1.03	.....	.....	46	.15
Tonsillitis, pharyngitis, and sore throat	20,010	60.96	1	.003	2	.01	17,339	57.92	1	.003	2	.01
Peritonitis	77	.23	4	.01	24	.07	69	.23	4	.01	24	.08
Dyspepsia, colic, and constipation	20,661	62.94	37	.11	2	.01	18,149	60.63	32	.11	2	.01
Gastritis	3,177	9.68	26	.08	17	.05	2,968	9.91	24	.08	16	.05
Diarrhœal diseases, all	59,765	182.05	96	.29	259	.79	56,827	189.82	94	.31	254	.85
Enteritis	1,682	5.12	9	.03	40	.12	1,533	5.12	9	.03	37	.12
Perityphlitis and appendicitis	400	1.22	14	.04	33	.10	370	1.24	13	.04	31	.10
Digestive system, others	10,013	30.50	79	.24	71	.22	9,009	30.09	75	.25	67	.22
Total diseases of the digestive system	116,108	353.67	266	.81	496	1.51	106,571	355.98	252	.84	479	1.60
Heart, diseases of	1,574	4.79	391	1.19	118	.36	1,455	4.86	363	1.21	107	.36
Arteries and veins	463	1.41	88	.27	29	.09	442	1.48	86	.29	23	.08
Total diseases of the circulatory system	2,637	6.20	479	1.46	147	.45	1,897	6.34	449	1.50	130	.43
Bronchitis	22,877	69.69	35	.11	4	.01	20,426	68.23	33	.11	4	.01
Pneumonia	1,241	3.78	14	.04	202	.62	1,076	3.59	13	.04	184	.61
Pleurisy	845	2.57	24	.07	8	.02	749	2.50	21	.07	7	.02
Respiratory system, others	9,860	30.03	63	.19	22	.07	9,140	30.53	60	.20	18	.06
Total diseases of the respiratory system	34,823	106.07	136	.41	236	.72	31,391	104.85	127	.42	213	.71
Kidneys, diseases of	610	1.86	62	.19	87	.27	552	1.84	55	.18	79	.26
Varicocele	558	1.70	46	.14	.....	.....	533	1.78	44	.15	.....	.....
Genito-urinary, others	2,550	7.77	78	.24	2	.01	2,192	7.32	67	.22	2	.01
Total diseases of the genito-urinary system	3,718	11.33	186	.57	89	.27	3,277	10.95	166	.55	81	.27

Adenitis	1,325	4.04	8	.02			1,169	3.90	8	.03		
Lymphatic system, others	222	.68	7	.02	2	.01	202	.67	7	.02	2	.01
Total diseases of the lymphatic system	1,547	4.71	15	.05	2	.01	1,371	4.58	15	.05	2	.01
Rheumatism, muscular	16,289	49.61	149	.45			14,038	46.89	130	.43		
Osteitis and periostitis	345	1.05	30	.09			311	1.04	24	.08		
Arthritis and synovitis	1,606	4.89	115	.35			1,371	4.58	105	.35		
Rheumatism, chronic articular	3,487	10.62	230	.70	1	.003	2,994	10.00	196	.65	1	.003
Muscles, bones, and joints, others	1,036	3.16	104	.32	1	.003	966	3.23	96	.32		
Total diseases of the muscles, bones, and joints	22,763	69.34	628	1.91	2	.01	19,680	65.74	551	1.84	1	.003
Total diseases of the integumentary system	28,009	85.32	52	.16	5	.02	26,510	88.55	47	.16	3	.01
Total diseases of the eye	4,910	14.96	241	.73			4,115	13.74	215	.72		
Total diseases of the ear	2,584	7.87	169	.51	6	.02	2,448	8.18	161	.54	5	.02
Total diseases of the nose	495	1.51	23	.07	1	.003	454	1.52	21	.07	1	.003
Total unclassified and undiagnosed	2,175	6.62	7	.02	11	.03	2,055	6.86	7	.02	9	.03
Total for diseases	417,526	1,271.78	4,316	13.15	2,786	8.49	382,604	1,278.01	3,936	13.15	2,557	8.54
Drowning					214	.65					182	.61
Exhaustion from exposure and fatigue	1,363	4.15	1	.003	13	.04	1,319	4.41	1	.003	12	.04
Heat stroke	802	2.44	10	.03	12	.04	770	2.57	9	.03	11	.04
Lightning stroke	17	.05	1	.003	6	.02	16	.05	1	.003	5	.02
Venomous bites, stings, and wounds	1,082	3.30	2	.01			1,012	3.38	2	.01		
Abrasions, blisters, burns, and scalds	5,982	18.22	3	.01			5,583	18.65	3	.01		
Compression and concussion of brain	188	.57	5	.02	21	.06	173	.58	4	.01	20	.07
Contusions and sprains	36,364	110.76	56	.17	4	.01	32,750	109.39	49	.16	4	.01
Dislocations	813	2.48	21	.06	1	.003	746	2.49	17	.06	1	.003
Fractures (not shot)	2,197	6.69	134	.41	47	.14	2,028	6.77	126	.42	39	.13
Hernia	1,239	3.77	331	1.01	2	.01	1,163	3.88	308	1.03	2	.01
Wounds, contused, lacerated, and punctured	9,642	29.37	37	.11	7	.02	8,445	28.20	34	.11	7	.02
Wounds, incised	4,916	14.97	22	.07	25	.08	4,376	14.62	22	.07	23	.08
Wounds, gunshot	3,080	9.38	392	1.19	653	1.99	2,672	8.93	361	1.21	581	1.94
Secondary, results of injury	802	2.44	81	.25	1	.003	694	2.32	73	.24	1	.003
Other injuries	7,247	22.07	66	.20	117	.36	6,286	21.00	56	.19	114	.38
Total for injuries	75,734	230.69	1,162	3.54	1,123	3.42	68,031	227.24	1,066	3.56	1,002	3.35
Total for diseases and injuries	493,260	1,502.47	5,478	16.69	3,909	11.91	450,635	1,505.25	5,002	16.71	3,559	11.89

TABLE III (*d* continued).—*Admissions to sick report, discharges, and deaths, with ratios per 1,000 of mean strength, for the decade 1890–1899.*

Decade 1890–1899.	Colored troops.						Indian troops.					
Mean strength	2,665						227					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	1	0.04										
Measles	115	4.31					8	3.52				
Smallpox	15	.56										
Vaccinia	877	32.90					226	99.56				
Influenza	2,139	80.25			4	0.15	79	34.81				
Dengue	84	3.15										
Mumps	236	8.85					42	18.50				
Diphtheria	21	.79										
Typhoid fever	182	6.83			35	1.31	1	.44				
Yellow fever	205	7.69			26	.98						
Cerebro-spinal fever	6	.23			6	.23						
Malarial fever, intermittent	4,446	166.81					66	29.08				
Malarial fever, remittent	946	35.49			11	.41	4	1.76				
Malarial fever, pernicious	25	.94			14	.53						
Malarial cachexia	526	19.73	2	0.08	2	.08						
Fever, undetermined	288	10.81					13	5.73				
Erysipelas	26	.98			4	.15	13	5.73				
Septicæmia and tetanus	1	.04			1	.04						
Rheumatic fever	174	6.53	4	.15			9	3.96	1	0.44		
Consumption	88	3.30	43	1.61	19	.71	54	23.79	26	11.41	16	7.04
Cancer	5	.19	1	.04	2	.08						
Syphilis and results	424	15.91	42	1.58	1	.04	33	14.54	6	2.64		
Gonorrhœa and results	1,587	59.54	5	.19			149	65.64				
Chancroid and results	623	23.37	1	.04			26	11.45				
Infectious, others	69	2.59	1	.04	2	.08	21	9.25	2	.88		
Total infectious diseases	13,109	491.83	99	3.71	127	4.77	744	327.75	35	15.37	16	7.04
Anæmia	17	.64	2	.08								
Nutrition, others	24	.90	11	.41	1	.04	1	.44				
Total diseases of nutrition	41	1.54	13	.49	1	.04	1	.44				
Alcoholism	149	5.59			1	.04	10	4.41				
Brain and spinal cord	214	8.03	13	.49	6	.23	3	1.32	1	.44	1	.44

Insanity	24	.90	18	.68	1	.04						
Meningitis	2	.08			2	.08						
Poisoning, narcotic	6	.23	1	.04	1	.04	1	.44				
Nervous system, others	1,147	43.04	7	.26	2	.08	71	31.28	2	.88		
Total diseases of the nervous system	1,542	57.86	39	1.46	13	.49	85	37.45	3	1.32	1	.44
Poisoning, irritant	16	.60			2	.08						
Tonsillitis, pharyngitis, and sore throat	2,550	95.68					121	53.30				
Peritonitis	8	.30										
Dyspepsia, colic, and constipation	2,380	89.29	5	.19			132	58.15				
Gastritis	206	7.73	2	.08	1	.04	3	1.32				
Diarrheal diseases, all	2,841	106.59	2	.08	5	.19	97	42.74				
Enteritis	148	5.55			3	.11	1	.44				
Perityphlitis and appendicitis	30	1.13	1	.04	2	.08						
Digestive system, others	971	36.43	4	.15	4	.15	33	14.54				
Total diseases of the digestive system	9,150	343.29	14	.53	17	.64	387	170.50				
Heart, diseases of	114	4.28	26	.98	10	.38	5	2.20	2	.88	1	.44
Arteries and veins	21	.79	2	.08	6	.23						
Total diseases of the circulatory system	135	5.07	28	1.05	16	.60	5	2.20	2	.88	1	.44
Bronchitis	2,330	87.41	2	.08			121	53.30				
Pneumonia	143	5.36	1	.04	16	.60	22	9.69			2	.88
Pleurisy	91	3.41	1	.04	1	.04	5	2.20	2	.88		
Respiratory system, others	672	25.21	2	.08	4	.15	48	21.15	1	.44		
Total diseases of the respiratory system	3,236	121.40	6	.23	21	.79	196	86.34	3	1.32	2	.88
Kidneys, diseases of	58	2.18	7	.26	8	.30						
Varicocele	25	.94	2	.08								
Genito-urinary, others	342	12.83	10	.38			16	7.05	1	.44		
Total diseases of the genito-urinary system	425	15.94	19	.71	8	.30	16	7.05	1	.44		
Adenitis	135	5.06					21	9.25				
Lymphatic system, others	17	.64					3	1.32				
Total diseases of the lymphatic system	152	5.70					24	10.57				
Rheumatism, muscular	2,170	81.41	19	.71			81	35.69				
Ostetis and periostitis	33	1.24	5	.19			1	.44	1	.44		
Arthritis and synovitis	232	8.70	10	.38			3	1.32				
Rheumatism, chronic articular	175	17.82	32	1.20			18	7.93	2	.88		
Muscles, bones, and joints, others	65	2.44	7	.26	1	.04	5	2.20	1	.44		
Total diseases of the muscles, bones, and joints	2,975	111.61	73	2.74	1	.04	108	47.57	4	1.76		

TABLE III (*d* continued).—*Admissions to sick report, discharges, and deaths, with ratio per 1,000 of mean strength, for the decade 1890–1899*—C't'd.

Decade 1890–1899.	Colored troops.						Indian troops.					
Mean	2,665						227					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Total diseases of the integumentary system	1,344	50.42	5	0.19	2	0.08	155	68.29				
Total diseases of the eye	663	24.87	25	.94			132	58.15	1	0.44		
Total diseases of the ear	118	4.43	8	.30			18	7.93			1	0.44
Total diseases of the nose	37	1.39	2	.08			4	1.76				
Total unclassified and undiagnosed	106	3.98			1	.04	14	6.17			1	.44
Total for diseases	33,033	1,239.33	331	12.42	207	7.77	1,889	832.16	49	21.57	22	9.68
Drowning					31	1.16					1	.44
Exhaustion from exposure and fatigue	44	1.65			1	.04						
Heat stroke	32	1.20	1	.04	1	.04						
Lightning stroke	1	.04			1	.04						
Venomous bites, stings, and wounds	67	2.51					3	1.32				
Abrasions, blisters, burns, and scalds	339	12.72					60	26.43				
Compression and concussion of brain	15	.56	1	.04	1	.04						
Contusions and sprains	3,340	125.31	7	.26			274	120.71				
Dislocations	54	2.03	4	.15			13	5.73				
Fractures (not shot)	144	5.40	8	.30	4	.15	25	11.01			4	1.76
Hernia	73	2.74	20	.75			3	1.32	3	1.32		
Wounds, contused, lacerated, and punctured	1,059	39.73	3	.11			140	61.67				
Wounds, incised	486	18.23			2	.08	54	23.79				
Wounds, gunshot	393	14.74	29	1.09	61	2.29	15	6.61	2	.88	11	4.84
Secondary, results of injury	104	3.90	7	.26			4	1.76	1	.44		
Other injuries	909	34.11	10	.38	3	.11	52	22.91				
Total for injuries	7,060	264.87	90	3.38	105	3.94	643	283.28	6	2.64	16	7.04
Total for diseases and injuries	40,093	1,504.20	421	15.79	312	11.71	2,532	1,115.42	55	24.21	38	16.72

TABLE IV (*a*).—*Admissions to sick report, discharges, and deaths, with ratios per 1,000 of mean strength for 1901.*

Year 1901.	Pacific islands, Volunteers.						Pacific islands and China, Regulars.						Pacific islands and China, total.					
Mean strength	10,606						48,920						59,526					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever							1	0.02					1	0.02				
Measles	69	6.51			1	0.09	282	5.76	1	0.02	2	0.04	351	5.90	1	0.02	3	0.05
Smallpox	12	1.13			5	.47	73	1.49			32	.65	85	1.43			37	.62
Vaccinia	34	3.21					175	3.58					209	3.51				
Influenza	45	4.24					158	3.23					203	3.41				
Dengue	154	14.52					1,731	35.38			1	.02	1,885	31.67			1	.02
Mumps	64	6.03					674	13.78					738	12.40				
Diphtheria	2	.19					9	.18			2	.04	11	.18			2	.03
Typhoid fever	42	3.96			6	.57	273	5.58			52	1.06	315	5.29			58	.97
Cerebro spinal fever	1	.09			1	.09	3	.06	1	.02	2	.04	4	.07	1	.02	3	.05
Malarial fever, intermittent	4,351	410.24					21,328	435.98					25,679	431.39				
Malarial fever, remittent	689	64.96			1	.09	3,421	69.93			5	.10	4,110	69.05			6	.10
Malarial fever, pernicious	10	.94			5	.47	60	1.23			28	.57	70	1.18			33	.55
Malarial cachexia	210	19.80	1	0.09	2	.19	654	13.37	7	.14	11	.22	864	14.51	8	.13	13	.22
Fever, undetermined	217	20.46					1,294	26.45					1,511	25.38				
Erysipelas	6	.57			1	.09	28	.57			2	.04	34	.57			3	.05
Septicæmia and tetanus	2	.19			1	.09	26	.53			14	.29	28	.47			15	.25
Rheumatic fever	25	2.36					207	4.23			1	.02	232	3.90			1	.02
Consumption	38	3.58	9	.85	17	1.60	256	5.23	95	1.94	58	1.19	294	4.94	104	1.75	75	1.26
Cancer							6	.12			2	.04	6	.10			2	.03
Syphilis and results	102	9.62			1	.09	969	19.81	19	.39	3	.06	1,071	17.99	19	.32	4	.07
Gonorrhœa and results	559	52.70	1	.09			4,581	93.64	6	.12	1	.02	5,140	86.35	7	.12	1	.02
Chancroid and results	411	38.75					1,964	40.15					2,375	39.90				
Infectious, others	10	.94	1	.09	1	.09	27	.55	6	.12	4	.08	37	.62	7	.12	5	.08
Total infectious diseases	7,053	665.09	12	1.13	42	3.96	38,200	780.87	135	2.76	220	4.50	45,253	760.22	147	2.47	262	4.40
Anæmia	21	1.98			2	.19	200	4.09			1	.02	221	3.71			3	.05
Nutrition, others	4	.38	1	.09	1	.09	57	1.17	1	.02	4	.08	61	1.02	2	.03	5	.08
Total diseases of nutrition	25	2.36	1	.09	3	.28	257	5.25	1	.02	5	.10	282	4.74	2	.03	8	.13
Alcoholism	69	6.51					1,031	21.07	3	.06	19	.39	1,100	18.48	3	.05	19	.32
Brain and spinal cord	21	1.98	5	.47	2	.19	139	2.84	17	.35	2	.04	160	2.69	22	.37	4	.07
Insanity	20	1.89	27	2.55			100	2.04	73	1.49			120	2.02	100	1.68		

TABLE IV (*a*).—*Admissions to sick report, discharges, and deaths, with ratios per 1,000 of mean strength for 1901*—Continued.

Year 1901.	Pacific islands, Volunteers.						Pacific islands and China, Regulars.						Pacific islands and China, total.					
Mean strength	10,606						48,920						59,526					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Meningitis	2	0.19	.....	.....	1	0.09	9	0.18	2	0.04	2	0.04	11	0.18	2	0.03	3	0.05
Poisoning, narcotic	10	.94	.....	.....	.....	.....	75	1.53	3	.06	2	.04	85	1.43	3	.05	2	.03
Nervous system, others	205	19.33	.....	.....	.....	.....	1,254	25.63	13	.27	1	.02	1,459	24.51	13	.22	1	.02
Total diseases of the nervous system	327	30.83	32	3.02	3	.28	2,608	53.31	111	2.27	26	.53	2,935	49.31	143	2.40	29	.49
Poisoning, irritant	3	.28	.....	.....	.....	.....	137	2.80	.....	.....	3	.06	140	2.35	.....	.....	3	.05
Tonsillitis, pharyngitis, and sore throat	178	16.78	.....	.....	.....	.....	1,129	23.08	.....	.....	.....	.....	1,307	21.96	.....	.....	.....	.....
Peritonitis	2	.19	.....	.....	1	.09	7	.14	1	.02	9	.18	9	.15	1	.02	10	.17
Dyspepsia, colic, and constipation	611	57.61	.....	.....	.....	.....	3,765	76.97	.....	.....	.....	.....	4,376	73.52	.....	.....	.....	.....
Gastritis	318	29.98	.....	.....	.....	.....	2,691	55.01	2	.04	4	.08	3,009	50.55	2	.03	4	.07
Dysentery, acute	468	44.13	.....	.....	15	1.41	3,461	70.75	.....	.....	98	2.00	3,929	66.01	.....	.....	113	1.90
Dysentery, chronic	214	20.18	.....	.....	45	4.24	1,859	38.00	15	.31	117	2.39	2,073	34.82	15	.25	162	2.72
Diarrheal diseases, others	2,280	214.97	.....	.....	5	.47	14,773	301.98	4	.08	14	.29	17,053	286.48	1	.07	19	.32
Enteritis	106	9.99	.....	.....	5	.47	1,392	28.46	2	.04	10	.20	1,498	25.16	2	.03	15	.25
Perityphlitis and appendicitis	20	1.89	.....	.....	1	.09	137	2.80	2	.04	7	.14	157	2.64	2	.03	8	.13
Digestive system, others	302	28.47	.....	.....	2	.19	2,101	42.95	26	.53	18	.37	2,403	40.37	26	.44	20	.34
Total diseases of the digestive system	4,502	424.48	.....	.....	74	6.98	31,452	642.93	52	1.06	280	5.72	35,954	604.00	52	.87	354	5.95
Heart, diseases of	26	2.45	2	.19	5	.47	298	6.09	46	.94	14	.29	324	5.44	48	.81	19	.32
Arteries and veins	14	1.32	2	.19	1	.09	69	1.41	1	.02	4	.08	83	1.39	3	.05	5	.08
Total diseases of the circulatory system	40	3.77	4	.38	6	.57	367	7.50	47	.96	18	.37	407	6.84	51	.86	24	.40
Bronchitis	374	35.26	.....	.....	.....	.....	1,893	38.70	1	.02	.....	.....	2,267	38.09	1	.02	.....	.....
Pneumonia	55	5.19	.....	.....	14	1.32	141	2.88	1	.02	20	.41	196	3.29	1	.02	34	.57
Pleurisy	32	3.02	.....	.....	.....	.....	156	3.19	3	.06	.....	.....	188	3.16	3	.05	.....	.....
Respiratory system, others	163	15.37	.....	.....	.....	.....	888	18.15	7	.14	1	.02	1,051	17.65	7	.12	1	.02
Total diseases of the respiratory system	624	58.83	.....	.....	14	1.32	3,078	62.92	12	.25	21	.43	3,702	62.19	12	.20	35	.59
Kidneys, diseases of	37	3.49	3	.28	4	.38	191	3.90	5	.10	19	.39	228	3.83	8	.13	23	.39
Varicocele	42	3.96	.....	.....	.....	.....	182	3.72	.....	.....	.....	.....	224	3.76	.....	.....	.....	.....

Genito-urinary, others	122	11.50					585	11.96	4	.08	1	.02	707	11.88	4	.07	1	.02
Total diseases of the genito-urinary system	201	18.95	3	.28	4	.38	958	19.58	9	.18	20	.41	1,159	19.47	12	.20	24	.40
Adenitis	71	6.69					330	6.75	1	.02			401	6.74	1	.02		
Lymphatic system, others	12	1.13					47	.96	1	.02			59	.99	1	.02		
Total diseases of the lymphatic system	83	7.83					377	7.71	2	.04			460	7.73	2	.03		
Rheumatism, muscular	245	23.10					1,747	35.71	7	.14			1,992	33.47	7	.12		
Osteitis and periostitis	13	1.23	1	.09			83	1.70	2	.04	1	.02	96	1.61	3	.05	1	.02
Arthritis and synovitis	111	10.46	3	.28			302	6.17	9	.18			413	6.94	12	.20		
Rheumatism, chronic articular	29	2.73	1	.09			429	8.77	15	.31			458	7.69	16	.27		
Muscles, bones, and joints, others	41	3.87	8	.75			211	4.31	18	.37			252	4.23	26	.44		
Total diseases of the muscles, bones, and joints	439	41.39	13	1.23			2,772	56.67	51	1.04	1	.02	3,211	53.94	64	1.08	1	.02
Total diseases of the integumentary system	1,532	144.44	1	.09			8,715	178.15	2	.04	1	.02	10,247	172.15	3	.05	1	.02
Total diseases of the eye	113	10.65	7	.66			753	15.39	23	.47			866	14.55	30	.50		
Total diseases of the ear	99	9.33	29	2.73			909	18.58	27	.55			1,008	16.93	56	.94		
Total diseases of the nose	4	.38					50	1.02					54	.91				
Total unclassified and undiagnosed	100	9.43					65	1.33					165	2.77				
Total for diseases	15,142	1,427.68	102	9.62	146	13.77	90,561	1,851.21	472	9.65	592	12.10	105,703	1,775.75	574	9.64	738	12.40
Drowning					9	.85					81	1.66					90	1.51
Exhaustion from exposure and fatigue	34	3.21					244	4.99					278	4.67				
Heat-stroke	5	.47					114	2.33	4	.08	8	.16	119	2.00	4	.07	8	.13
Lightning stroke							1	.02					1	.02				
Venomous bites, stings, and wounds	74	6.98					351	7.17					425	7.14				
Abrasions, blisters, burns, and scalds	194	18.29	2	.19			1,071	21.89			1	.02	1,265	21.25	2	.03	1	.02
Compression and concussion of brain	3	.28					28	.57			4	.08	31	.52			4	.07
Contusions and sprains	405	38.19					2,984	61.00	2	.04			3,389	56.92	2	.03		
Dislocations	23	2.17					131	2.68	2	.04			154	2.59	2	.03		
Fractures (not shot)	42	3.96	5	.47			357	7.30	24	.49	15	.31	396	6.70	29	.48	15	.25
Hernia	45	4.24	7	.66			200	4.09	23	.47			245	4.12	30	.50		
Wounds, contused, lacerated, and punctured	112	10.56					948	19.38	2	.04	4	.08	1,060	17.81	2	.03	4	.07
Wounds, incised	99	9.33	4	.38	4	.38	629	12.86	3	.06	78	1.59	708	11.90	7	.12	82	1.38
Wounds, gunshot	57	5.37	75	7.07	21	1.98	269	5.50	78	1.59	98	2.00	326	5.48	153	2.57	119	2.00
Secondary results of injury	19	1.79	5	.47			131	2.68	4	.08			150	2.52	9	.15		
Other injuries	39	3.68					462	9.44	2	.04	8	.16	501	8.42	2	.03	8	.13
Total for injuries	1,151	108.52	98	9.24	34	3.21	7,920	161.90	144	2.94	297	6.07	9,074	152.49	242	4.07	338	5.56
Total for diseases and injuries	16,293	1,536.20	200	18.86	180	16.97	98,481	2,013.10	616	12.59	889	18.17	114,774	1,928.14	816	13.71	1,062	17.96

TABLE IV (*b*).—*Admissions to sick report, discharges, and deaths, with ratios per 1,000 of mean strength for 1901.*

Year 1901.	Cuba.						Porto Rico.					
Mean strength	5,297						1,153					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	2	0.38										
Measles	1	.19										
Vaccinia	53	10.01					19	16.48				
Influenza	88	16.61					22	19.08				
Dengue							1	.87				
Mumps	10	1.89					18	15.61				
Diphtheria												
Typhoid fever	17	3.21			2	0.38	12	10.41			1	0.87
Yellow fever	14	2.64			1	.19						
Cerebro-spinal fever												
Malarial fever, intermittent	1,038	195.97					217	188.20				
Malarial fever, remittent	141	26.62			1	.19	39	33.83				
Malarial cachexia	16	3.02	1	0.19			1	.87				
Fever, undetermined	69	13.03					7	6.07				
Erysipelas							1	.87			1	.87
Septicæmia and tetanus	1	.19			1	.19						
Rheumatic fever	23	4.34					5	4.34				
Consumption	26	4.91	12	2.27	3	.57	5	4.34	3	2.60		
Syphilis and results	118	22.28	6	1.13			69	59.84	7	6.07		
Gonorrhœa and results	617	116.48	4	.76	1	.19	165	143.11				
Chancroid and results	257	48.52					123	106.68	1	.87		
Infectious, others	2	.38							1	.87		
Total infectious diseases	2,493	470.65	23	4.34	9	1.70	704	610.58	12	10.41	2	1.73
Anæmia	3	.57										
Nutrition, others	2	.38	3	.57								
Total diseases of nutrition	5	.94	3	.57								
Alcoholism	190	35.87					32	27.75				
Brain and spinal cord	6	1.13	6	1.13			3	2.60				
Insanity	8	1.51	4	.76			4	3.47	4	3.47		

Poisoning, narcotic	3	.57	1	.19			1	.87				
Nervous system, others	101	19.07	1	.19			24	20.81	1	.87		
Total diseases of the nervous system	308	58.15	12	2.27			64	55.51	5	4.34		
Poisoning, irritant	5	.94									1	.87
Tonsillitis, pharyngitis, and sore throat	161	30.40					24	20.81				
Peritonitis	1	.19			1	.19					1	.87
Dyspepsia, colic, and constipation	413	77.98					56	48.57				
Gastritis	148	27.94					12	10.41				
Dysentery, acute	59	11.14					19	16.48				
Dysentery, chronic	2	.38					2	1.73	1	.87		
Diarrheal diseases, others	586	110.63					53	45.97				
Enteritis	31	5.85					2	1.73			1	.87
Perityphlitis and appendicitis	9	1.70			2	.38	4	3.47			1	.87
Digestive system, others	179	33.79	1	.19			33	28.62				
Total diseases of the digestive system	1,594	300.93	1	.19	3	.57	205	177.80	1	.87	4	3.47
Heart, diseases of	18	3.40	5	.94	2	.38	1	.87				
Arteries and veins	6	1.13					4	3.47				
Total diseases of the circulatory system	24	4.53	5	.94	2	.38	5	4.34				
Bronchitis	223	42.10					51	44.23				
Pneumonia	6	1.13			3	.57	2	1.73			1	.87
Pleurisy	7	1.32					3	2.60				
Respiratory system, others	145	27.37	1	.19			2	1.73				
Total diseases of the respiratory system	381	71.93	1	.19	3	.57	58	50.30			1	.87
Kidneys, diseases of	7	1.32					5	4.34				
Varicocele	20	3.78					1	.87				
Genito-urinary, others	87	16.42	3	.57			20	17.35				
Total diseases of the genito-urinary system	111	21.52	3	.57			26	22.56				
Adenitis	34	6.42					16	13.88				
Lymphatic system, others	13	2.45					1	.87				
Total diseases of the lymphatic system	47	8.87					17	14.74				
Rheumatism, muscular	167	31.53	1	.19			34	29.49	1	.87		
Osteitis and periostitis	11	2.08	1	.19								
Arthritis and synovitis	62	11.70	2	.38			8	6.94	1	.87		
Rheumatism, chronic articular	10	1.89					16	13.88				
Muscles, bones, and joints, others	38	7.17	2	.38			5	4.34				
Total diseases of the muscles, bones, and joints	288	54.37	6	1.13			63	54.64	2	1.73		
Total diseases of the integumentary system	1,007	190.11	2	.38			222	192.54				
Total diseases of the eye	70	13.22	1	.19			25	21.68				

TABLE IV (*b*).—*Admissions to sick report, discharges, and deaths, with ratios per 1,000 of mean strength for 1901*—Continued.

Year 1901.	Cuba.						Porto Rico.					
Mean strength	5,297						1,153					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Total diseases of the ear	40	7.55	1	0.19			16	13.88				
Total diseases of the nose	4	.76										
Total unclassified and undiagnosed	11	2.08					2	1.73				
Total for diseases	6,386	1,205.59	58	10.95	17	3.21	1,407	1,220.30	20	17.35	7	6.07
Drowning					6	1.13					1	.87
Exhaustion from exposure and fatigue	6	1.13					1	.87				
Heat stroke	1	.19										
Lightning stroke												
Venomous bites, stings, and wounds	32	6.04					8	6.94				
Abrasions, blisters, burns, and scalds	141	26.62					16	13.88				
Compression and concussion of brain	2	.38					1	.87				
Contusions and sprains	1,065	201.06					82	71.12				
Dislocations	24	4.53										
Fractures (not shot)	57	10.76	6	1.13	1	.19	9	7.81			1	.87
Hernia	19	3.59	2	.38			2	1.73				
Wounds, contused, lacerated, and punctured	215	40.59	2	.38			32	27.75				
Wounds, incised	115	21.71					13	11.27				
Wounds, gunshot	29	5.48	3	.57	4	.76			1	.87		
Secondary, results of injury	19	3.59	1	.19			2	1.73				
Other injuries	139	26.24	1	.19			4	3.47				
Total for injuries	1,864	351.90	15	2.83	11	2.08	170	147.43	1	.87	2	1.73
Total for diseases and injuries	8,250	1,557.49	73	13.78	28	5.29	1,577	1,367.74	21	18.21	9	7.81

TABLE IV (*c*).—*Admissions to sick report, discharges, and deaths, with ratios per 1,000 of mean strength for 1901.*

Year 1901.	Total islands and China.						United States (continental).					
Mean strength	65,976.						26,515.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	3	0.05					11	0.41				
Measles	352	5.34	1	0.02	3	0.05	417	15.73	4	0.15	9	0.34
Smallpox	85	1.29			37	.56	40	1.51				
Vaccinia	281	4.26					2,474	93.31				
Influenza	313	4.74					2,295	86.56			1	.04
Dengue	1,886	28.59			1	.02	4	.15				
Mumps	766	11.61					616	23.23				
Diphtheria	11	.17			2	.03	16	.60				
Typhoid fever	344	5.21			61	.92	250	9.43	5	.19	17	.64
Yellow fever	14	.21			1	.02						
Cerebro-spinal fever	4	.06	1	.02	3	.05	1	.04				
Malarial fever, intermittent	26,934	408.24					2,564	96.70				
Malarial fever, remittent	4,290	65.03			7	.11	325	12.26				
Malarial fever, pernicious	70	1.06			33	.50	3	.11				
Malarial cachexia	881	13.35	9	.14	13	.20	113	4.26	9	.34	1	.04
Fever, undetermined	1,587	24.06					218	8.22				
Erysipelas	35	.53			4	.06	34	1.28				
Septicæmia and tetanus	29	.44			16	.24	1	.04			4	.15
Rheumatic fever	260	3.94			1	.02	106	4.00				
Consumption	325	4.93	119	1.80	78	1.18	127	4.79	81	3.06	17	.64
Cancer	6	.09			2	.03	5	.19	4	.15	1	.04
Syphilis and results	1,258	19.07	32	.49	4	.06	543	19.55	85	3.21	2	.08
Gonorrhœa and results	5,922	89.77	11	.17	2	.03	2,703	101.21	31	1.17		
Chancroid and results	2,755	41.76	1	.02			700	26.40	1	.04		
Infectious, others	39	.59	8	.12	5	.08	19	.72	3	.11	1	.04
Total infectious diseases	48,450	734.36	182	2.76	273	4.14	13,615	513.48	223	8.41	53	2.00
Anæmia	224	3.40			3	.05	52	1.96	2	.08		
Nutrition, others	63	.96	5	.08	5	.08	31	1.17	25	.94	1	.04
Total diseases of nutrition	287	4.35	5	.08	8	.12	83	3.13	27	1.02	1	.04
Alcoholism	1,322	20.04	3	.05	19	.29	696	26.25	7	.26	7	.26
Brain and spinal cord	169	2.56	28	.42	4	.06	118	4.45	43	1.62	2	.08

TABLE IV (*c*).—*Admissions to sick report, discharges, and deaths, with ratios per 1,000 of mean strength for 1901*—Continued.

Year 1901.	Total islands and China.						United States (continental).					
Mean strength	65,976.						26,515.					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Insanity	132	2.00	108	1.64	.....	.....	34	1.28	34	1.28	.....	.....
Meningitis	11	.17	2	.03	3	0.05	4	.15	1	.04	3	0.11
Poisoning, narcotic	89	1.35	4	.06	2	.03	19	.72	3	.11	5	.19
Nervous system, others	1,584	24.01	15	.23	1	.02	622	23.46	23	.87	.....	.....
Total diseases of the nervous system	3,307	50.13	160	2.43	29	.44	1,493	56.31	111	4.19	17	.64
Poisoning, irritant	145	2.20	.....	.....	4	.06	201	7.58	1	.04	.....	.....
Tonsillitis, pharyngitis, and sore throat	1,492	22.62	.....	.....	.....	.....	2,526	95.27	.....	.....	.....	.....
Peritonitis	10	.15	1	.02	12	.18	3	.11	.....	.....	1	.04
Dyspepsia, colic, and constipation	4,845	73.45	.....	.....	.....	.....	1,988	74.98	3	.11	.....	.....
Gastritis	3,169	48.04	2	.03	4	.06	393	14.82	4	.15	.....	.....
Dysentery, acute	4,007	60.75	.....	.....	113	1.71	196	7.39	.....	.....	2	.08
Dysentery, chronic	2,077	31.48	16	.24	162	2.46	314	11.84	37	1.40	9	.34
Diarrheal diseases, others	17,692	268.17	4	.06	19	.29	2,611	98.47	5	.19	.....	.....
Enteritis	1,531	23.21	2	.03	16	.24	225	8.49	1	.04	1	.04
Perityphlitis and appendicitis	170	2.58	2	.03	11	.17	95	3.58	3	.11	4	.15
Digestive system, others	2,615	39.64	27	.41	20	.30	899	33.91	21	.79	4	.15
Total diseases of the digestive system	37,753	572.23	54	.82	361	5.47	9,451	356.44	75	2.83	21	.79
Heart, diseases of	343	5.20	53	.80	21	.32	225	8.49	76	2.87	4	.15
Arteries and veins	93	1.41	3	.05	5	.08	51	1.92	23	.87	1	.04
Total diseases of the circulatory system	436	6.61	56	.85	26	.39	276	10.41	99	3.73	5	.19
Bronchitis	2,541	38.52	1	.02	.....	.....	2,077	78.33	4	.15	.....	.....
Pneumonia	204	3.09	1	.02	38	.58	139	5.24	2	.08	15	.57
Pleurisy	198	3.00	3	.05	.....	.....	101	3.81	2	.08	1	.04
Respiratory system, others	1,198	18.16	8	.12	1	.02	902	34.02	7	.26	.....	.....
Total diseases of the respiratory system	4,141	62.77	13	.20	39	.59	3,219	121.40	15	.57	16	.60
Kidneys, diseases of	240	3.64	8	.12	23	.35	110	4.15	13	.49	11	.41
Varicocele	245	3.71	.....	.....	.....	.....	136	5.13	7	.26	.....	.....

Genito-urinary, others	814	12.34	7	.11	1	.02	364	13.73	13	.49	.....	.....
Total diseases of the genito-urinary system	1,299	19.69	15	.23	24	.36	610	23.01	33	1.24	11	.41
Adenitis	451	6.84	1	.02	.....	.....	133	5.02	.....	.....	.....	.....
Lymphatic system, others	73	1.11	1	.02	.....	.....	43	1.62	1	.04	.....	.....
Total diseases of the lymphatic system	524	7.94	2	.03	.....	.....	176	6.64	1	.04	.....	.....
Rheumatism, muscular	2,193	33.24	9	.14	.....	.....	1,203	45.37	7	.26	.....	.....
Osteitis and periostitis	107	1.62	4	.06	1	.02	54	2.04	2	.08	.....	.....
Arthritis and synovitis	483	7.32	15	.23	.....	.....	214	8.07	20	.75	.....	.....
Rheumatism, chronic articular	484	7.34	16	.24	.....	.....	263	9.92	14	.53	.....	.....
Muscles, bones, and joints, others	295	4.47	28	.42	.....	.....	158	5.96	34	1.28	.....	.....
Total diseases of the muscles, bones, and joints	3,562	53.99	72	1.09	1	.02	1,892	71.36	77	2.90	.....	.....
Total diseases of the integumentary system	11,476	173.95	5	.08	1	.02	2,715	102.40	3	.11	.....	.....
Total diseases of the eye	961	14.57	31	.47	.....	.....	459	17.31	61	2.30	.....	.....
Total diseases of the ear	1,064	16.13	57	.86	.....	.....	340	12.82	58	2.19	.....	.....
Total diseases of the nose	58	.88	.....	.....	.....	.....	89	3.36	3	.11	.....	.....
Total unclassified and undiagnosed	178	2.70	.....	.....	.....	.....	56	2.11	.....	.....	.....	.....
Total for diseases	113,496	1,720.26	652	9.88	762	11.55	34,474	1,300.17	786	29.64	124	4.68
Drowning	.....	.....	.....	.....	97	1.47	.....	.....	.....	.....	16	.60
Exhaustion from exposure and fatigue	285	4.32	.....	.....	.....	.....	85	3.21	.....	.....	1	.04
Heat stroke	120	1.82	4	.06	8	.12	87	3.28	1	.04	1	.04
Lightning stroke	1	.02	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Venomous bites, stings, and wounds	465	7.05	.....	.....	.....	.....	108	4.07	2	.08	.....	.....
Abrasions, blisters, burns, and scalds	1,422	21.56	2	.03	1	.02	527	19.87	.....	.....	.....	.....
Compression and concussion of brain	34	.52	.....	.....	4	.06	16	.60	1	.04	1	.04
Contusions and sprains	4,536	68.76	2	.03	.....	.....	3,417	128.87	1	.04	.....	.....
Dislocations	178	2.70	2	.03	.....	.....	101	3.81	4	.15	.....	.....
Fractures (not shot)	465	7.05	35	.53	17	.26	283	10.67	13	.49	5	.19
Hernia	266	4.03	32	.49	.....	.....	138	5.20	54	2.04	.....	.....
Wounds, contused, lacerated, and punctured	1,307	19.81	4	.06	4	.06	861	32.47	4	.15	.....	.....
Wounds, incised	856	12.97	7	.11	82	1.24	364	13.73	3	.11	3	.11
Wounds, gunshot	355	5.38	157	2.38	123	1.86	120	4.53	26	.98	23	.87
Secondary, results of injury	171	2.59	10	.15	.....	.....	108	4.07	30	1.13	.....	.....
Other injuries	644	9.76	3	.05	8	.12	416	15.69	10	.38	9	.34
Total for injuries	11,105	168.33	258	3.91	344	5.21	6,631	250.08	149	5.62	59	2.23
Total for diseases and injuries	124,601	1,888.59	910	13.79	1,106	16.76	41,105	1,550.25	935	35.26	183	6.90

TABLE V (*a*).—*Admissions to sick report, discharges, and deaths, with ratios per 1,000 of mean strength, for 1901.*

Year 1901.	Infantry.						Cavalry.						Artillery.					
Mean strength	52,588.						15,699.						13,296.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever	5	0.10					4	0.25					4	0.30				
Measles	432	8.22	1	0.02	6	0.11	199	12.68			2	0.13	35	2.63				
Smallpox	75	1.43			26	.49	29	1.85			10	.64	9	.68				
Vaccinia	846	16.09					413	26.31					1,036	77.91				
Influenza	621	11.81			1	.02	629	40.07					989	74.38				
Dengue	1,256	23.89					337	21.47			1	.06	177	13.31				
Mumps	944	17.95					208	13.25					115	8.65				
Diphtheria	14	.27			2	.04	3	.19					4	.30				
Typhoid fever	301	5.72	1	.02	51	.97	148	9.43	1	0.06	15	.96	91	6.84			6	0.45
Yellow fever							1	.06					4	.30			1	.08
Cerebro-spinal fever	4	.08			2	.04	1	.06			1	.06			1	0.08		
Malarial fever, intermittent	21,744	413.48					4,340	276.44					2,149	161.63				
Malarial fever, remittent	3,374	64.17			5	.10	693	44.14			1	.06	277	20.83				
Malarial fever, pernicious	57	1.08			26	.49	8	.51			6	.38						
Malarial cachexia	720	13.69	10	.19	11	.21	100	6.37	4	.25	1	.06	89	6.69	2	.15	1	.08
Fever, undetermined	1,145	21.78					425	27.07					133	10.00				
Erysipelas	44	.84			2	.04	14	.89			1	.06	8	.60			1	.08
Septicæmia and tetanus	20	.38			10	.19	6	.38			4	.25	2	.15			1	.08
Rheumatic fever	217	4.13			1	.02	75	4.78					45	3.38				
Consumption	255	4.85	106	2.02	71	1.35	65	4.14	24	1.53	15	.96	62	4.66	44	3.31	4	.30
Cancer	10	.19	3	.06	3	.06							1	.08	1	.08		
Syphilis and results	1,078	20.50	46	.87	6	.11	342	21.78	31	1.97			250	18.80	28	2.11		
Gonorrhœa and results	4,749	90.32	24	.46	1	.02	1,952	124.33	4	.25			1,345	101.16	11	.83	1	.08
Chancroid and results	2,086	39.67	1	.02			762	48.54					446	33.54				
Infectious, others	31	.59	5	.10	4	.08	10	.64	4	.25	2	.13	9	.68	2	.15		
Total infectious diseases	40,028	761.18	197	3.75	228	4.34	10,764	685.66	68	4.33	59	3.76	7,280	547.53	89	6.69	15	1.13
Anæmia	180	3.42			3	.06	30	1.91					31	2.33	1	.08		
Nutrition, others	53	1.01	7	.13	3	.06	21	1.34	11	.70	2	.13	7	.53	3	.23		
Total diseases of nutrition	233	4.43	7	.13	6	.11	51	3.25	11	.70	2	.13	38	2.86	4	.30		
Alcoholism	1,125	21.40	3	.06	16	.30	248	15.80	2	.13	2	.13	465	34.97	4	.30	4	.30
Brain and spinal cord	151	2.87	27	.51	4	.08	61	3.89	17	1.08			44	3.31	17	1.28		
Insanity	107	2.03	98	1.86			21	1.34	20	1.27			16	1.20	10	.75		

Meningitis	10	.19	2	.04	4	.08	4	.25	1	.06	2	.13	1	.08				
Poisoning, narcotic	78	1.48	4	.08	3	.06	10	.64	1	.06			7	.53	1	.08		
Nervous system, others	1,277	24.29	20	.38	1	.02	394	25.10	8	.51			306	23.01	10	.75		
Total diseases of the nervous system	2,748	52.26	154	2.93	28	.53	738	47.01	49	3.12	4	.25	839	63.10	42	3.16	4	.30
Poisoning, irritant	268	5.10			3	.06	55	3.50					13	.98	1	.08		
Tonsillitis, pharyngitis, and sore throat	1,843	35.05					936	59.63					819	61.60				
Peritonitis	6	.11	1	.02	7	.13	5	.32			5	.32	1	.08			1	.08
Dyspepsia, colic, and constipation	3,903	74.23					1,396	88.93	1	.06			1,027	77.24	1	.08		
Gastritis	2,372	45.11	3	.06	4	.08	591	37.65	1	.06			358	26.93	1	.08		
Dysentery, acute	3,114	59.23			90	1.71	658	41.92			14	.89	145	10.90			1	.08
Dysentery, chronic	1,626	30.92	21	.40	127	2.42	299	19.05	19	1.21	26	1.66	193	14.51	8	.60	7	.53
Diarrhœal diseases, others	13,667	259.90	7	.13	15	.29	3,997	254.61	2	.13	2	.13	1,797	135.15			1	.08
Enteritis	995	18.93	2	.04	13	.25	311	19.81			3	.19	309	23.24				
Perityphlitis and appendicitis	130	2.47	1	.02	7	.13	55	3.50	3	.19	1	.25	39	2.93			1	.08
Digestive system, others	2,056	39.10	26	.49	20	.38	643	40.96	5	.32	2	.13	525	39.48	7	.53	2	.15
Total diseases of the digestive system	29,980	570.11	61	1.16	286	5.44	8,946	569.85	31	1.97	56	3.57	5,226	393.01	18	1.35	13	.98
Heart, diseases of	316	6.01	56	1.07	16	.30	104	6.63	35	2.23	5	.32	77	5.79	15	1.13		
Arteries and veins	88	1.67	7	.13	4	.08	21	1.34	1	.06	1	.06	13	.98	6	.45	1	.08
Total diseases of the circulatory system	404	7.68	63	1.20	20	.38	125	7.96	36	2.29	6	.38	90	6.77	21	1.58	1	.08
Bronchitis	2,326	44.23	2	.04			848	54.02					969	72.87	2	.15		
Pneumonia	215	4.09	2	.04	34	.65	52	3.31			6	.38	35	2.63			3	.23
Pleurisy	174	3.31	2	.04	1	.02	46	2.93	1	.06			48	3.61	2	.15		
Respiratory system, others	1,077	20.48	8	.15	1	.02	336	21.40	1	.06			523	39.33	1	.08		
Total diseases of the respiratory system	3,792	72.11	14	.27	36	.68	1,282	81.67	2	.13	6	.38	1,575	118.46	5	.38	3	.23
Kidneys, diseases of	211	4.01	11	.21	21	.40	51	3.25	5	.32	3	.19	32	2.41	1	.08	5	.38
Varicocele	182	3.46					89	5.67	5	.32			72	5.42				
Genito-urinary, others	662	12.59	4	.08	1	.02	194	12.36	10	.64			199	14.97	5	.38		
Total diseases of the genito-urinary system	1,055	20.06	15	.29	22	.42	334	21.28	20	1.27	3	.19	303	22.79	6	.45	5	.38
Adenitis	331	6.29	1	.02			124	7.90					84	6.32				
Lymphatic system, others	55	1.05	2	.04			30	1.91					28	2.11				
Total diseases of the lymphatic system	386	7.34	3	.06			154	9.81					112	8.43				
Rheumatism, muscular	1,931	36.72	8	.15			592	37.71	3	.19			641	48.26	5	.38		
Osteitis and periostitis	91	1.73	1	.02			26	1.66	2	.13			30	2.26				
Arthritis and synovitis	416	7.91	12	.23			132	8.41	9	.57			196	7.36	8	.60		
Rheumatism, chronic articular	146	8.48	20	.38			97	6.18	3	.19			104	7.82	3	.23		
Muscles, bones, and joints, others	249	4.96	27	.51			102	6.50	11	.70			55	4.14	8	.60		
Total diseases of the muscles, bones, and joints	3,143	59.77	71	1.35			949	60.45	28	1.78			996	68.14	32	1.60		

TABLE V (*a*).—*Admissions to sick report, discharges, and deaths, with ratios per 1,000 of mean strength, for 1901*—Continued.

Year 1901.	Infantry.						Cavalry.						Artillery.					
Mean strength	52,588.						15,699.						13,296.					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Total diseases of the integumentary system	8,775	166.87	5	0.10	.....	.....	3,104	197.72	2	0.13	1	0.06	1,723	129.59	1	0.08	.....	.....
Total diseases of the eye	787	14.97	39	.74	.....	.....	279	17.77	9	.57	.....	.....	191	14.36	7	.53	.....	.....
Total diseases of the ear	874	16.62	63	1.20	.....	.....	221	14.08	19	1.21	.....	.....	183	13.76	18	1.35	.....	.....
Total diseases of the nose	46	.87	1	.02	.....	.....	27	1.72	.....	.....	.....	.....	63	4.74	2	.15	.....	.....
Total unclassified and undiagnosed	144	2.74	.....	.....	.....	.....	41	2.61	.....	.....	.....	.....	34	2.56	.....	.....	.....	.....
Total for diseases	92,395	1,756.96	693	13.18	626	11.90	27,015	1,720.81	275	17.52	137	8.73	18,563	1,396.13	235	17.67	41	3.08
Drowning	.....	.....	.....	.....	81	1.54	.....	.....	.....	.....	17	1.08	.....	.....	.....	.....	8	.60
Exhaustion from exposure and fatigue	232	4.41	.....	.....	1	.02	60	3.82	.....	.....	.....	.....	59	4.44	.....	.....	.....	.....
Heat stroke	99	1.88	4	.08	4	.08	67	4.27	.....	.....	1	.06	29	2.18	1	.08	3	.23
Lightning stroke	1	.02	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Venomous bites, stings, and wounds	349	6.64	1	.02	.....	.....	127	8.09	1	.06	.....	.....	55	4.14	.....	.....	.....	.....
Abrasions, blisters, burns, and scalds	1,144	21.75	2	.04	1	.02	452	28.79	.....	.....	.....	.....	271	20.38	.....	.....	.....	.....
Compression and concussion of brain	25	.48	1	.02	4	.08	18	1.15	.....	.....	1	.06	3	.23	.....	.....	.....	.....
Contusions and sprains	3,186	60.59	3	.06	.....	.....	2,752	175.30	.....	.....	.....	.....	1,682	126.50	.....	.....	.....	.....
Dislocations	155	2.95	2	.04	.....	.....	58	3.69	2	.13	.....	.....	50	3.76	2	.15	.....	.....
Fractures (not shot)	368	7.00	26	.49	12	.23	195	12.42	15	.96	5	.32	135	10.15	5	.38	5	.38
Hernia	223	4.24	36	.68	.....	.....	72	4.59	24	1.53	.....	.....	57	4.29	6	.45	.....	.....
Wounds, contused, lacerated, and punctured	984	18.71	2	.04	4	.08	638	40.64	5	.32	.....	.....	422	31.74	1	.08	.....	.....
Wounds, incised	699	13.29	8	.15	75	1.43	268	17.07	1	.06	5	.32	198	14.89	.....	.....	1	.08
Wounds, gunshot	269	5.12	146	2.78	99	1.88	118	7.52	27	1.72	23	1.47	65	4.89	5	.38	12	.90
Secondary, results of injury	147	2.80	13	.25	.....	.....	64	4.08	7	.45	.....	.....	41	3.08	12	.90	.....	.....
Other injuries	487	9.26	5	.10	10	.19	273	17.39	5	.32	3	.19	235	17.67	3	.23	2	.15
Total for injuries	8,368	159.13	249	4.73	291	5.53	5,162	328.81	87	5.54	55	3.50	3,302	248.35	35	2.63	31	2.33
Total for diseases and injuries	100,763	1,916.08	942	17.91	917	17.44	32,177	2,049.62	362	23.06	192	12.23	21,865	1,644.48	270	20.30	72	5.41

TABLE V (*b*).—*Admissions to sick report, discharges, and deaths, with ratios per 1,000 of mean strength for 1901.*

Year 1901.	Engineers.						Ordnance.						Signal Corps.					
Mean strength	996						759						753					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Scarlet fever							1	1.32										
Measles	2	2.01											2	2.66				
Vaccinia	20	20.08					8	10.54					4	5.31				
Influenza	25	25.10					99	130.43					6	7.97				
Dengue	4	4.02					5	6.59					18	23.90				
Mumps	17	17.07											2	2.66				
Diphtheria							1	1.32										
Typhoid fever	3	3.01					4	5.27					4	5.31			1	1.33
Malarial fever, intermittent	226	226.91					35	46.11					112	148.74				
Malarial fever, remittent	29	29.12					7	9.22					42	55.78				
Malarial fever, pernicious	1	1.00			1	1.00							2	2.66				
Malarial cachexia	10	10.04					1	1.32					16	21.25				
Fever, undetermined	8	8.03					3	3.95					8	10.62				
Erysipelas							1	1.32										
Rheumatic fever	1	1.00																
Consumption	8	8.03	4	4.02	1	1.00	3	3.95					10	13.28	5	6.64		
Syphilis and results	17	17.07					1	1.32					10	13.28	1	1.33		
Gonorrhea and results	61	61.25					7	9.22					38	50.47				
Chancroid and results	37	37.15											15	19.92				
Infectious, others							1	1.32					1	1.33				
Total infectious diseases	469	470.89	4	4.02	2	2.01	177	233.20					290	385.13	6	7.97	1	1.33
Anæmia	2	2.01					2	2.64					5	6.64				
Nutrition, others	4	4.02																
Total diseases of nutrition	6	6.02					2	2.64					5	6.64				
Alcoholism	29	29.12					18	23.72					25	33.20				
Brain and spinal cord	3	3.01	1	1.00			3	3.95	2	2.64								
Insanity	2	2.01					4	5.27	2	2.64					1	1.33		
Poisoning, narcotic													1	1.33				
Nervous system, others	30	30.12					21	27.67					19	25.23				
Total diseases of the nervous system	64	64.26	1	1.00			46	60.61	4	5.27			45	59.76	1	1.33		

TABLE V (*b*).—*Admission to sick report, discharges, and deaths, with ratios per 1,000 of mean strength for 1901*—Continued.

Year 1901.	Engineers.						Ordnance.						Signal Corps.					
Mean strength	996						759						753					
	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
Causes of admission to sick report.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Poisoning, irritant	1	4.02											1	1.33			1	1.33
Tonsillitis, pharyngitis, and sore throat	27	27.11					28	36.89					9	11.95				
Dyspepsia, colic, and constipation	51	51.21					36	47.43					32	42.50	1	1.33		
Gastritis	35	35.14					7	9.22					28	37.19				
Dysentery, acute	45	45.18			5	5.02	9	11.86					33	43.82				
Dysentery, chronic	37	37.15	2	2.01	1	1.00	2	2.64					28	37.19	2	2.66	3	3.98
Diarrheal diseases, others	262	263.06			1	1.00	52	68.51					75	99.60				
Enteritis	28	28.11			1	1.00	2	2.64					12	15.94				
Perityphlitis and appendicitis	2	2.01											2	2.66				
Digestive system, others	41	41.17	1	1.00			26	34.26					17	22.58				
Total diseases of the digestive system	532	534.14	3	3.01	8	8.03	162	213.44					237	314.74	3	3.98	4	5.31
Heart, diseases of	12	12.05					8	10.54			2	2.64	6	7.97				
Arteries and veins	1	1.00					1	1.32					1	1.33				
Total diseases of the circulatory system	13	13.05					9	11.86			2	2.64	7	9.30				
Bronchitis	51	51.21					41	54.02					20	26.56				
Pneumonia	2	2.01					2	2.64			1	1.32						
Pleurisy	3	3.01					2	2.64					2	2.66				
Respiratory system, others	20	20.08					36	47.43					6	7.97				
Total diseases of the respiratory system	76	76.30					81	106.72			1	1.32	28	37.18				
Kidneys, diseases of	11	11.04	1	1.00			5	6.59			1	1.32	4	5.31			1	1.33
Varicocele	7	7.03											4	5.31				
Genito-urinary, others	17	17.07					4	5.27					10	13.28				
Total diseases of the genito-urinary system	35	35.14	1	1.00			9	11.86			1	1.32	18	23.90			1	1.33
Adenitis	7	7.03					2	2.64					3	3.98				
Lymphatic system, others	1	1.00					1	1.32										
Total diseases of the lymphatic system	8	8.03					3	3.95					3	3.98				

Rheumatism, muscular	35	35.14	1	1.00			62	81.69					9	11.95				
Osteitis and periostitis							4	5.27										
Arthritis and synovitis	11	11.04	3	3.01			1	1.32										
Rheumatism, chronic articular	19	19.08					7	9.22					5	6.64				
Muscles, bones, and joints, others	3	3.01					1	1.32					4	5.31	1	1.33		
Total diseases of the muscles, bones, and joints	68	68.27	4	4.02			75	98.81					18	23.90	1	1.33		
Total diseases of the integumentary system	95	95.38					43	56.65					44	58.43				
Total diseases of the eye	21	21.08	1	1.00			14	18.45					10	13.28	1	1.33		
Total diseases of the ear	23	23.09	1	1.00			15	19.76					10	13.28	1	1.33		
Total diseases of the nose	1	1.00					1	1.32					2	2.66				
Total unclassified and undiagnosed													2	2.66				
Total for diseases	1,411	1,416.67	15	15.06	10	10.04	637	839.26	4	5.27	4	5.27	719	954.85	13	17.26	6	7.97
Drowning					1	1.00											1	1.33
Exhaustion from exposure and fatigue	4	4.02					1	1.32					1	1.33				
Heat-stroke	3	3.01					4	5.27					2	2.66				
Venomous bites, stings, and wounds	10	10.04					6	7.91										
Abrasions, blisters, burns, and scalds	19	19.08					3	3.95					4	5.31				
Compression and concussion of brain													2	2.66				
Contusions and sprains	61	61.25					47	61.93					20	26.56				
Dislocations	3	3.01					4	5.27					1	1.33				
Fractures (not shot)	11	11.04	1	1.00			1	1.32					3	3.98				
Hernia	4	4.02	1	1.00			1	1.32					2	2.66	1	1.33		
Wounds, contused, lacerated, and punctured	28	28.11					9	11.86					6	7.97				
Wounds, incised	6	6.02					5	6.59					2	2.66				
Wounds, gunshot	1	1.00			2	2.01							1	1.33			1	1.33
Secondary results of injury	4	4.02					4	5.27										
Other injuries	10	10.04					6	7.91			1	1.32	5	6.64				
Total for injuries	164	164.66	2	2.01	3	3.01	91	119.89			1	1.32	49	65.07	1	1.33	2	2.66
Total for diseases and injuries	1,575	1,581.33	17	17.07	13	13.05	728	959.16	4	5.27	5	6.59	768	1,019.92	14	18.59	8	10.62

TABLE V (*c*).—*Admissions to sick report, discharges, and deaths, with ratios per 1,000 of mean strength for 1901.*

Year 1901	Medical Corps.						Others.					
Mean strength	4,477.						3,923.					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Measles	8	1.79					91	23.20	4	1.02	4	1.02
Smallpox	3	0.67			1	0.22	9	2.29				
Vaccinia	21	4.69					407	103.75				
Influenza	80	17.87					159	40.53				
Dengue	85	18.98					8	2.04				
Mumps	29	6.48					67	17.08				
Diphtheria	2	.45					3	.76				
Typhoid fever	27	6.03	2	0.45	4	.89	16	4.08	1	.25	1	.25
Yellow fever	9	2.01										
Malarial fever, intermittent	600	134.02					292	74.44				
Malarial fever, remittent	160	35.74					33	8.41			1	.25
Malarial fever, pernicious	5	1.12										
Malarial cachexia	46	10.27			1	.22	12	3.06	2	.51		
Fever, undetermined	69	15.41					14	3.57				
Erysipelas							2	.51				
Septicæmia and tetanus	2	.45			5	1.12						
Rheumatic fever	13	2.90					15	3.82				
Consumption	37	8.26	10	2.23	3	.67	12	3.06	7	1.78	1	.25
Syphilis and results	45	10.05	6	1.34			28	7.14	5	1.27		
Gonorrhœa and results	238	53.16	3	.67			295	75.20				
Chancroid and results	64	14.30	1	.22			45	11.47				
Infectious, others	3	.67					3	.76				
Total infectious diseases	1,546	345.32	22	4.91	14	3.13	1,511	385.17	19	4.84	7	1.78
Anæmia	23	5.14					3	.76	1	.25		
Nutrition	5	1.12			1	.22	4	1.02	9	2.29		
Total diseases of nutrition	28	6.25			1	.22	7	1.78	10	2.55		
Alcoholism	65	14.52			4	.89	43	10.96	1	.25		
Brain and spinal cord	11	2.46	3	.67	1	.22	14	3.57	4	1.02	1	.25
Insanity	8	1.79	4	.89			8	2.04	7	1.78		
Poisoning, narcotic	10	2.23	1	.22	2	.45	2	.51			2	.51
Nervous system, others	100	22.34					59	15.04				
Total diseases of the nervous system	194	43.33	8	1.79	7	1.56	126	32.12	12	3.06	3	.76

Poisoning, irritant	5	1.12										
Tonsillitis, pharyngitis, and sore throat	120	26.80					236	60.16				
Peritonitis							1	.25				
Dyspepsia, colic, and constipation	177	39.54					211	53.79				
Gastritis	121	27.03	1	.22			50	12.75				
Dysentery, acute	178	39.76			3	.67	21	5.35			2	.51
Dysentery, chronic	192	42.89	1	.22	6	1.34	14	3.57			1	.25
Diarrheal diseases, other	288	64.33					165	42.06				
Enteritis	82	18.32					17	4.33	1	.25		
Perityphlitis and appendicitis	26	5.81	1	.22	2	.45	11	2.80			1	.25
Digestive system, others	137	30.60	5	1.12			69	17.59	4	1.02		
Total diseases of the digestive system	1,326	296.18	8	1.79	11	2.46	795	202.65	5	1.27	4	1.02
Heart, diseases of	14	3.13	8	1.79	1	.22	31	7.90	15	3.82	1	.25
Arteries and veins	12	2.68	4	.89			7	1.78	8	2.04		
Total diseases of the circulatory system	26	5.81	12	2.68	1	.22	38	9.69	23	5.86	1	.25
Bronchitis	127	28.37	1	.22			236	60.16				
Pneumonia	13	2.90	1	.22	3	.67	24	6.12			6	1.53
Pleurisy	14	3.13					10	2.55				
Respiratory system, others	39	8.71	4	.89			63	16.06	1	.25		
Total diseases of the respiratory system	193	43.11	6	1.34	3	.67	333	84.89	1	.25	6	1.53
Kidneys, diseases of	26	5.81	2	.45	1	.22	10	2.55	1	.25	2	.51
Varicocele	16	3.57					11	2.80	2	.51		
Genito-urinary, others	47	10.50					45	11.47	1	.25		
Total diseases of the genito-urinary system	89	19.88	2	.45	1	.22	66	16.82	4	1.02	2	.51
Adenitis	23	5.14					10	2.55				
Lymphatic system, others							1	.25				
Total diseases of the lymphatic system	23	5.14					11	2.80				
Rheumatism, muscular	83	18.54					73	18.61	1	.25		
Osteitis and periostitis	5	1.12			1	.22	5	1.27				
Arthritis and synovitis	17	3.80	1	.22			14	3.57	2	.51		
Rheumatism, chronic articular	53	11.84	3	.67			16	4.08	1	.25		
Muscles, bones, and joints, others	16	3.57	3	.67			13	3.31	12	3.06		
Total diseases of the muscles, bones, and joints	174	38.86	7	1.56	1	.22	121	30.84	16	4.08		
Total diseases of the integumentary system	218	48.69					189	48.18				
Total diseases of the eye	72	16.08	6	1.34			46	11.73	29	7.39		
Total diseases of the ear	46	10.27	8	1.79			32	8.16	5	1.27		
Total diseases of the nose	4	.89					3	.76				
Total unclassified and undiagnosed	4	.89					9	2.29				
Total for diseases	3,943	880.72	79	17.65	39	8.71	3,287	837.88	124	31.61	23	5.86

TABLE V (*c*).—*Admissions to sick report, discharges, and deaths, with ratios per 1,000 of mean strength for 1901*—Continued.

Year 1901	Medical Corps.						Others.					
Mean strength	1,477.						3,923.					
Causes of admission to sick report.	Admissions.		Discharges.		Deaths.		Admissions.		Discharges.		Deaths.	
	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.	Number.	Ratio.
Drowning					2	0.45					3	0.76
Exhaustion from exposure and fatigue	5	1.12					8	2.01				
Heat stroke	2	.45			1	.22	1	.25				
Lightning stroke												
Venomous bites, stings, and wounds	11	3.13					12	3.06				
Abrasions, blisters, burns, and scalds	18	4.02					38	9.69				
Compression and concussion of brain							2	.51				
Contusions and sprains	69	15.41					136	34.67				
Dislocations	6	1.34					2	.51				
Fractures (not shot)	18	4.02					17	4.33	1	0.25		
Hernia	26	5.81	5	1.12			19	4.84	13	3.31		
Wounds, contused, lacerated, and punctured	22	4.91					59	15.04				
Wounds, incised	12	2.68	1	.22	2	.45	30	7.65			2	.51
Wounds, gunshot	15	3.35	2	.45	6	1.34	6	1.53	3	.76	3	.76
Secondary, results of injury	10	2.23					9	2.29	8	2.04		
Other injuries	19	4.24					25	6.37			1	.25
Total for injuries	236	52.71	8	1.79	11	2.46	364	92.79	25	6.37	9	2.29
Total for diseases and injuries	4,179	933.44	87	19.43	50	11.17	3,651	930.67	149	37.98	32	8.16

INTERNATIONAL TABLE I.—*Examination of recruits during the year 1901.*

No.		White.	Negro.	Total.
1	Total number of recruits examined	56,894	1,888	58,782
	Of each 1,000 of these—			
2	Were accepted for service	623.93	647.78	624.70
3	Were rejected for under height	2.74	3.71	2.77
4	Were rejected for disabilities	286.66	279.13	286.42
	Of each 1,000 accepted recruits the heights were as follows (in inches):			
5	Under 61	.37	.....	.35
6	61 to 62	.34	.....	.33
7	62 to 63	1.69	4.09	1.77
8	63 to 64	15.86	17.99	15.93
9	64 to 65	98.54	106.30	98.80
10	65 to 66	124.71	148.81	125.51
11	66 to 67	167.16	165.17	167.10
12	67 to 68	166.69	178.25	167.07
13	68 to 69	157.14	156.17	157.10
14	69 to 70	123.02	96.48	122.14
15	70 to 71	82.31	67.05	81.81
16	71 to 72	35.97	37.61	36.03
17	72 to 73	16.76	15.54	16.72
18	73 to 74	6.96	5.72	6.92
19	74 upward	2.48	.82	2.42
	Causes of rejection (exclusive of under height) expressed in ratios per 1,000 of examined recruits:			
20	Physical debility	2.27	.....	2.19
21	Tuberculosis of lungs or other organs	2.09	3.19	2.13
22	Imperfect vision	41.36	24.89	40.80
23	Heart disease	27.54	22.25	27.37
24	Goiter	.28	.....	.27
25	Varicose veins, varicocele, hemorrhoids	41.09	20.13	40.42
26	Hernia	13.02	12.18	13.00
27	Flat feet	2.60	5.83	2.70

INTERNATIONAL TABLE III.—*Movements of sick by branches of military service and by months.*

VOLUNTEERS AND REGULARS, 1901.

	Absolute numbers.					Proportions for 1,000.			
			Sick disposed of—			In 1,000 of mean strength there were—		In 1,000 sick disposed of there were[a]—	
	Mean strength.	Sick admissions.	Total.[a]	As fit for duty (recovered).[a]	By death.	Total sick admissions.	Deaths.	Fit for duty (recovered).	Deaths.
ARM OF SERVICE.									
Infantry	52,588	100,763	.....	.....	917	1,916.08	17.44	.....	.....
Cavalry	15,699	32,177	.....	.....	192	2,049.62	12.23	.....	.....
Artillery	13,296	21,865	.....	.....	72	1,644.48	5.41	.....	.....
Ordnance	759	728	.....	.....	5	959.16	6.59	.....	.....
Engineers	996	1,575	.....	.....	13	1,581.33	13.05	.....	.....
Signal Corps	753	768	.....	.....	8	1,019.92	10.62	.....	.....
Medical Department	4,477	4,179	.....	.....	50	933.44	11.17	.....	.....
All others	3,923	3,651	.....	.....	32	930.67	8.16	.....	.....
MONTH.									
January	100,932	16,921	.....	.....	121	167.65	1.20	.....	.....
February	100,910	13,189	.....	.....	106	130.70	1.05	.....	.....
March	100,723	13,719	.....	.....	110	136.21	1.09	.....	.....
April	99,286	13,498	.....	.....	103	135.95	1.04	.....	.....
May	94,549	14,287	.....	.....	89	151.10	.94	.....	.....
June	91,669	14,274	.....	.....	100	155.71	1.09	.....	.....
July	84,942	15,845	.....	.....	95	186.54	1.12	.....	.....
August	86,716	14,875	.....	.....	101	171.53	1.16	.....	.....
September	87,664	13,368	.....	.....	145	152.49	1.65	.....	.....
October	88,680	12,983	.....	.....	122	146.40	1.38	.....	.....
November	87,524	11,287	.....	.....	103	128.96	1.18	.....	.....
December	86,303	11,460	.....	.....	94	132.78	1.09	.....	.....

[a] Information not tabulated.

INTERNATIONAL TABLE VI.—*Admissions of important diseases by branches of military service.*

VOLUNTEERS AND REGULARS, 1901.

No.	Diseases of the international nosological table.	Absolute number of admissions.								Admissions per 1,000 of mean strength.							
		Infantry.	Cavalry.	Artillery.	Ordnance.	Engineers.	Signal Corps.	Medical Department.	All others.	Infantry.	Cavalry.	Artillery.	Ordnance.	Engineers.	Signal Corps.	Medical Department.	All others.
1	Alcoholismus acutus, including delirium tremens	1,125	248	465	18	29	25	65	43	21.40	15.80	34.97	23.72	29.12	33.20	14.52	10.96
2	Bronchitis, all [a]	2,326	848	969	41	51	20	127	236	44.23	54.02	72.87	54.02	51.21	26.56	28.37	60.16
3	Cholera asiatica	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4	Cholera nostras [b]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
5	Diphtheria	14	3	4	1	.....	.....	2	3	.27	.19	.30	1.32	.....	.....	.45	.76
6	Dysenteria	4,740	957	338	11	82	61	370	35	90.15	60.97	25.41	14.50	82.33	81.01	82.65	8.92
7	Erysipelas	44	14	8	1	.....	.....	.....	2	.84	.89	.60	1.32	.....	.....	.....	.51
8	Febris intermittens (malaria)	21,744	4,340	2,149	35	226	112	600	292	413.48	276.44	161.63	46.11	226.91	148.74	134.02	74.44
9	Febris recurrens [c]	4,094	793	366	8	39	58	206	45	77.86	50.51	27.52	10.54	39.16	77.03	46.01	11.47
10	Gonorrhœa	4,749	1,952	1,345	7	61	38	238	295	90.32	124.33	101.16	9.22	61.25	50.47	53.16	75.20
11	Hernia	223	72	57	1	4	2	26	19	4.24	4.59	4.29	1.32	4.02	2.66	5.81	4.84
12	Influenza	621	629	989	99	25	6	80	159	11.81	40.07	74.38	130.13	25.10	7.97	17.87	40.53
13	Insolatio (Hitzschlag, coup de chaleur)	99	67	29	4	3	2	2	1	1.88	4.27	2.18	5.27	3.01	2.66	.45	.25
14	Meningitis cerebro spinalis epidemica	4	1	.....	.....	.....	.....	.....	.....	.08	.06	.....	.....	.....	.....	.....	.....
15	Morbilli	432	199	35	.....	2	2	8	91	8.22	12.68	2.63	.....	2.01	2.66	1.79	23.20
16	Parotitis epidemica	944	208	115	.....	17	2	29	67	17.95	13.25	8.65	.....	17.07	2.66	6.48	17.08
17	Pneumonia crouposa sive lobaris	215	52	35	2	2	.....	13	24	4.09	3.31	2.63	2.64	2.01	.....	2.90	6.12
18	Rheumatismus articulorum	663	172	149	7	20	5	66	31	12.61	10.96	11.20	9.22	20.08	6.64	14.74	7.92
19	Scarlatina	5	4	4	1	.....	.....	.....	.....	.10	.25	.30	1.32	.....	.....	.....	.....
20	Scorbutus	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
21	Syphilis	1,078	342	250	1	17	10	45	28	20.50	21.78	18.80	1.32	17.07	13.28	10.05	7.14
22	Trachoma [b]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
23	Tuberculosis pulmonum	255	65	62	3	8	10	37	12	4.85	4.14	4.66	3.95	8.03	13.28	8.26	3.06
24	Tuberculosis ceterorum organorum [b]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
25	Typhus abdominalis	301	148	91	4	3	4	27	16	5.72	9.43	6.84	5.27	3.01	5.31	6.03	4.08
26	Typhus exanthematicus [b]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
27	Variola	75	29	9	.....	.....	.....	3	9	1.43	1.85	.68	.....	.....	.....	.67	2.29
28	Morbi auris	874	221	183	15	23	10	46	32	16.62	14.08	13.76	19.76	23.09	13.28	10.27	8.16
29	Morbi cordis	316	104	77	8	12	6	14	31	6.01	6.63	5.79	10.54	12.05	7.97	3.13	7.90
30	Morbi cutis	8,775	3,104	1,723	43	95	44	218	189	166.87	197.72	129.59	56.65	95.38	58.43	48.69	48.18
31	Morbi mentis	107	21	16	4	2	.....	8	8	2.03	1.34	1.20	5.27	2.01	.....	1.79	2.04
32	Morbi oculi	787	279	191	14	21	10	72	46	14.97	17.77	14.36	18.45	21.08	13.28	16.08	11.73
33	Morbi systemat. urin. et sexual (excl. ven. et syphilis)	1,055	334	303	9	35	18	89	66	20.06	21.28	22.79	11.86	35.14	23.90	19.88	16.82

[a] Acute not tabulated separately.

[b] Not tabulated separately.

[c] Including malarial cachexia.

INTERNATIONAL TABLE VII.—*Admissions of important diseases by months (absolute numbers).*

VOLUNTEERS AND REGULARS, 1901.

No.	Diseases of the international nosological table.	Admissions by months.											
		Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	Alcoholismus acutus, including delirium tremens	142	113	154	169	184	158	184	187	194	173	176	184
2	Bronchitis, all [a]	499	380	436	411	398	291	258	325	308	443	440	429
3	Cholera asiatica												
4	Cholera nostras [b]												
5	Diphtheria	2	2	1	4	1	2	4	1		1	3	6
6	Dysenteria	599	415	491	404	482	521	882	829	585	494	437	455
7	Erysipelas	3	11	8	5	6	1	3	2	4	6	8	12
8	Febris intermittens	4,117	3,077	2,688	2,378	2,678	2,256	2,420	2,316	2,147	1,937	1,679	1,805
9	Febris recurrens [c]	842	552	545	468	436	419	461	473	443	402	274	294
10	Gonorrhœa	652	610	599	731	717	869	811	745	720	828	688	715
11	Hernia	49	29	43	37	34	36	31	34	23	28	24	36
12	Influenza	1,081	431	420	186	76	37	21	24	25	77	101	129
13	Insolatio (Hitzschlag, coup de chaleur)	1		7	11	25	22	47	33	15	15	16	12
14	Meningitis cerebro spinalis epidemica			1			2	1				1	
15	Morbilli	3	10	77	341	148	96	30	17	16	6	10	15
16	Parotitis epidemica	24	25	71	149	405	211	136	112	66	41	45	97
17	Pneumonia crouposa sive lobaris	47	34	40	47	27	21	14	19	18	29	22	25
18	Rheumatismus articulorum	99	92	107	98	76	116	75	81	106	99	80	84
19	Scarlatina		1	3	3	1					1	3	2
20	Scorbutus												
21	Syphilis	185	112	147	151	129	162	133	160	145	151	138	158
22	Trachoma [b]												
23	Tuberculosis pulmonum	52	27	41	33	38	40	40	54	31	38	34	24
24	Tuberculosis ceterorum organorum [b]												
25	Typhus abdominalis	36	29	40	35	30	43	64	71	79	77	44	46
26	Typhus exanthematicus [b]												
27	Variola	6	14	13	24	13	19	7	3	6	10	5	5
28	Morbi auris	112	95	102	126	149	141	126	159	111	102	99	82
29	Morbi cordis	48	31	51	44	50	56	49	47	42	53	44	33
30	Morbi cutis	1,231	1,067	1,100	1,121	1,201	1,177	1,336	1,318	1,251	1,291	1,066	1,037
31	Morbi mentis	27	10	15	13	17	15	8	17	14	13	9	8
32	Morbi oculi	123	110	133	134	146	121	101	132	129	127	81	83
33	Morbi sytemat. urin. et sexual (excl. ven. et syph.)	138	154	169	173	157	177	158	168	160	165	150	140

[a] Acute not tabulated separately.

[b] Not tabulated separately.

[c] Including malarial cachexia.

Respectfully submitted.

W. H. FORWOOD,
Surgeon-General U. S. Army.

Hon. ELIHU ROOT, *Secretary of War.*

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